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HOME

AND

CLIMATIC TREATMENT

OF

Pulmonary Consumption

ON THE

BASIS OF MODERN DOCTRINES.

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THIS VOLUME

IS DEDICATED TO

PROF. ALFRED L. LOOMIS,

OF NEW YORK CITY,

AS A TRIBUTE TO HIS EARNEST ENDEAVORS IN PROMOTING
OUR KNOWLEDGE OF THE PATHOLOGY OF
PULMONARY CONSUMPTION.

PREFACE.

The object of this little work is to present to the profession in a readable and easily assimilable form the most approved methods and lines of treatment of consumption, which I have endeavored to present strictly upon the basis of modern doctrines.

The opening chapter on pathology is to convey only a terse review of the leading factors which go to make up that clinical picture which we call pulmonary consumption.

In the chapter on home treatment, my endeavor has been to free the subject from all cumbersome material, and retain only such features as have stood the test of time. While thus sketching the present status of the treatment of pulmonary consumption, it is my earnest desire to draw attention to what seems to me the future path to be pursued in therapeutics, namely: To endeavor to bring nutrition to the highest point attainable, and retain it there long enough to enable us to pursue a *systematic course of antiseptic treatment of the general condition, laboring under chronic septicæmia, as well as of the local lesion.* Such a system, carefully planned in all.

its details, I have been carrying out for some time. As yet my statistics are in their infancy, but as the system is carefully elaborated and founded on a rational basis, I feel confident of the future.

"Climatic treatment" aims to set up a standard of factors requisite for an ideal climate. The claims of any locality or health-station are in part measured by this standard, in part by statistical results, as gathered from a variety of sources, all of which are duly credited. I am now at work collecting all meteorological data obtainable for the various States and sections of our country, in connection with the reports of the U. S. Signal Service and the Coast and Geodetic Survey, in order to stimulate further investigation into the all important subject of suitable climates for various forms and phases of phthisis.

Another factor which has decided me to publish the following letters (originally addressed to a friend in greater part), has been a desire to collect and summarize the much scattered material relating to the therapeutics of consumption, to preserve what is worth preserving, and present it in such a shape as to bring order out of chaos.

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PATHOLOGY OF CONSUMPTION.

The term "consumption" comprises all progressively destructive processes of the respiratory organs which do not occur successively and rapidly in the train of acute inflammations of the lung.

Pulmonary phthisis is not a morbid unity therefore; it stands as the collective expression, the highest potency of a number of more or less chronic inflammatory processes of the lung, which, having failed of restitution to the normal condition at an early period, lead in their further course to proliferation and shrinkage of connective tissue with or without pigmentation and bronchiectasis, to calcification or to progressive destruction of their cheesily degenerated infiltration and the formation of ulcerating cavities in the substance of the lung; at times to the formation and rapid dissemination of tubercle, either independently or in connection with the preceding conditions.

Thus consumption may result from unusually protracted acute inflammation of lung tissue, or the process may assume a lingering form from the outset. In either case the form and course of the disease are governed entirely by the constitution of the person affected. In other words, the amount of living matter (protoplasm) which each individual brings to his case will determine the future form of lung trouble.

This important fact teaches us that, since each individual in his composition is a law unto himself, so strict individualization is the most important factor in and the surest road to the correct diagnosis and prognosis as well as to the treatment of pulmonary consumption.

The following extract from my forthcoming publication, "Present Status of the Pathology of Pulmonary Consumption," will give you the pathological condition in different language:

"A low state of vitality may exist from infancy through hereditary influences, or may be acquired by various pernicious accidents of our career. By a 'low state of vitality' we understand a certain general condition of the system, which manifests itself by the reproduction of living matter of low grade and ready tendency to necrobiosis, which products are the only demonstrable evidence of said general condition. By 'living matter' I mean, in accordance with Prof. Heitzmann's teachings, all protoplasm from the finest granule to the full-fledged corpuscle. In impaired vitality living matter is defective as to quantity, a feature which we can recognize microscopically, and as to quality, a feature which we cannot recognize, and which change is most probably histo-chemical; but as yet we do not know this.

When this production of sparse living matter, with little tendency to development into normal connective tissue and epithelium, is hereditary, we speak of these products and of the person afflicted as scrofulous, and say they are vulnerable.

When it is acquired in a previously healthy person by lingering sickness or frequent repetition of abuses to the various organs, they likewise become vulnerable.

Vulnerability manifests itself in a more or less constant irritability of the pulmonary and gastric mucuous membranes, which irritation is readily answered by proliferation of sound or indifferent elements, (also called inflammatory corpuscles.)

These corpuscles in the healthy nature of things should : First, not multiply so numerously ; 2d, develop slowly into tissues of the connective tissue series and epithelium distinctly nucleated.

Instead of this they multiply rapidly and crowd upon one another and develop into imperfect, readily broken down connective tissue, still less perfect epithelium and in large part remain as inflammatory corpuscles.

Pulmonary disturbance in the vulnerable manifests itself, so far as the innervation is concerned, in irritability of the mucous membrane ; so far as the vascular apparatus is concerned, not in active arterial determination, but in venous stagnation with a tendency to clogging up of the fine ramifications of the capillaries. The tissues enclosed within the river delta of a capillary net, find themselves cut off from nutrition ; hence their death by anæmia, anæmic necrosis.

The products of this behavior of the vascular system may be properly said to be of the lowest forms of inflammation, and consist of : Weak connective tissue, inflammatory corpuscles and pre-existing normal epithelial and connective tissue, now undergoing anaemic necrosis. The first product differs from healthy connective tissue in its tendency to proliferate rapidly and imperfectly, and frequently as rapidly to break down ; the round corpuscles may undergo shrinkage and are then called cheese; the previously healthy tissue, cut

off from the nutrient supply, makes an attempt to regain the juvenile condition, but shrinks before accomplishing it (anæmic necrosis) and is then known as tubercle.

All these products may shrink, or they may become remoistened by serum and with it form pus.

The existence of several or all of these elements in the lung, their subsequent fate and the symptoms which accompany every stage of their fate, form a clinical picture which we are agreed to style pulmonary phthisis, consumption, pneumo-phthisis.

A short review of acute and chronic conditions of the lung, relating to their tendency to pass into consumption, may not be out of place here.

1. Acute inflammatory conditions:

Laryngeal, tracheal and bronchial catarrhs (laryngitis, tracheitis, bronchitis), In persons with plenty of living matter, absolute restitutio ad integrum. In individuals with sparse living matter, so-called scrofulous individuals, and such who, though previously healthy, have had their amount of living matter reduced by lingering disease, the likelihood is hyperplasia and subsequent contraction of connective tissue in loco. Extension of this process to the lesser bronchi and the parenchyma of the lung, will depend upon the future general condition of the patient and never becomes diffused.

Localized cheesy centres may form from shrinkage of formative elements (inflammatory corpuscles), which have developed at a time when a slight acute catarrh was superadded to the already existing condition. When once the connective tissue is in a state of proliferation, we have more

or less localized peribronchitis; in which case the continued qualitative and quantitative secretory changes in the mucous membrane are only secondary.

Chronic bronchitis, in the sense in which it has been spoken of in the past, is therefore a misnomer. Mere superficial catarrh of the bronchial mucous membrane cannot exist indefinitely, without proliferation and contraction of the underlying connective tissue—one form of peribronchitis.

Catarrhal pneumonia or capillary bronchitis gives rise in persons with reduced living matter to proliferation and contraction of bronchial and interalveolar connective tissue; in other words, to catarrho-fibroid phthisis. The occurrence of cheesy nodes of any notable dimensions is rare. Fresh catarrhs may produce them.

Croupous pneumonia. Inasmuch as only individuals with plenty of living matter and fibrine can be affected by croupous conditions (including croupous bronchitis), the patient who recovers gets rid of the fibrinous exudation and leaves no remnant for cheesy degeneration. Untoward circumstances, which reduce the amount of living matter, may result in a continuous infiltration of the submucous connective tissue and continued shedding of epithelium—the condition known as desquamative pneumonia. The result of this is a more or less widespread cirrhosis.

Desquamative pneumonia, the condition accompanying infectious diseases of scrofulous persons on the one hand and following as a sequel to other acute inflammations of the lung on the other, in cases where the disease has lasted for more than a limited period. This continued infiltration

and desquamation is the fruitful source of cheesy foci and of cirrhosis both. It is likewise in this class of cases that the sudden and fatal occurrence of purulent peribronchitis is an important factor.

2. Primarily chronic conditions:

Interstitial pneumonia aud peribronchitis simplex in its localized or diffused forms are nothing more nor less than fibroid phthisis in its various shapes and manifestations.

3. In *tuberculosis* we are dealing with those products of inflammation, or rather of necrosis, which are caused by multiple embolism or by thrombosis from venous stagnation. In the processes recited above we have had the results of active arterial determination (as in croupous and catarrhal pneumonia), and those of venous stagnation in part, as seen in desquamative processes and connective tissue proliferation. The formation of tubercle is largely dependent upon more or less continued capillary stagnation and thrombosis or upon multiple embolism.

The conditions favorable to the development of tubercule are often dependent upon the presence of a cheesy focus. Cheesy foci are chiefly to be found in scrofulous persons, such as have sparse living matter from infancy, or else they may be developed in the course of lingering disease or deprivation. Now tubercle may be, and often is strictly localized, not only in certain portions of the lung, but in other organs, with a predilection for serous membranes. In so far then as tubercule actually exists, and continues to exist without material change or without doing any harm, we may speak of *chronic tuberculosis.* But it must be remembered that in this condition, and while not undergoing softening, it is not

an active agent of destruction, and therefore not a dominant element in pulmonary consumption.

In the occurrence of *acute tuberculosis* the whole nature of the case changes. General dissemination of tubercle takes place, when this more or less long existing chronic condition suddenly develops, by self-infection, into a rapid course of destruction, and for this reason only do we speak of it as acute tuberculosis.

So you readily perceive that in regard to tubercle, its presence may be local or become general, thus leaving us to deal with different degrees of intensity. Remember, then, that tubercle in certain quantity, and not concentrated as to locality, may exist, shrink, or disappear without symptoms; that its becoming diffused is only another degree of intensity, and that this diffusion, with its accompanying manifestations, is the disease known as acute tuberculosis.

As regards the simultaneous presence of the three chief elements of consumption, I may say that one necessitates the presence of the other. In cirrhotic conditions, any new crop of inflammatory or indifferent elements may be converted into cheese by shrinkage.

Where a cheesy focus exists, whether it be an original centre of inflammatory elements or shrunken pus corpuscles in a cavity, there also will be found a greater or less condensation of connective tissue in the periphery, endeavoring to form a capsule.

Again where cheesy foci exist, localized tuberculosis is apt to follow. Scrofulous persons are those in whom we look for cheesy lymph—glands and inspissated superficial abscesses. Where the chances for absorption are as favora-

ble as they are in the lymphatic system, there will be found the greatest danger for the general dissemination of tubercle. This then is in accord with Rindfleisch who holds that scrofulous persons only can be affected by tuberculosis. If he had spoken of persons who primarily or secondarily suffer from an *insufficiency of living matter*, I would quite agree with him.

When cirrhosis of the lung is diffused, overshadowing, as it were, other conditions, we speak for convenience sake of fibroid phthisis. As it is most frequently the sequel to catarrhal conditions and forms their second stage, I propose for the same the appellation of *catarrho-fibroid phthisis.*

When a portion or the whole lobe of a lung is infiltrated by sluggish inflammatory products, which have undergone water-abstraction and shrinkage, we speak of *caseous phthisis, chronic cheesy pneumonia.*

When the presence of tubercle is manifested to a considerable extent in the lungs, by persistent catarrh of the bronchi, irreducible fever and great irritability of the mucous membranes, we speak of *tubercular phthisis* or *acute tuberculosis,* according to the severity of the case.

But please to remember, that these differences in nomenclature are only justified by the fact that one or the other of these conditions decidedly predominates.

The history of the case gives us the most important clue, next to the physical signs. From both history and present condition, as manifested by percussion and auscultation, we may be able to distinguish which of these three factors has been the starting point of the trouble.

Local proliferation of connective tissue and induration as

a sequel to a previously superficial catarrh or as a primarily independent proliferation of connective tissue.

Cheesy deposit, either in a cheesy gland dating from infancy or cheesy remnants in the wake of an acute trouble.

Local tuberculosis, either in the immediate neighborhood of and caused by a cheesy focus, or having its origin in some purulent source ; as yet, however, strictly localized.

Once, however, any process has passed its initial stages, it rarely remains unmixed with the others, one often seeming to be lost in the other.

Every one is familiar with the great frequency of consumption, as shown by statistics. No space can here be given to statistical matter, much of which is the result of local conditions and the percentage of accident.

The frequency of pulmonary consumption is not difficult to understand when the following facts are kept before the mind: First, the exposed position of the organ, leaving an easy approach to pathological insults.

Second, consumption, more than any other disease, is the outcome, the climax, of such general conditions of life as have strayed from the normal, physiological laws of existence.

Third, there is the peculiar structure of the lung; an enormous web and conglomeration of canals, supported by a comparatively feeble scaffolding, containing blood, lymph, and gases. In part these channels have almost structureless thin walls, and the lympathics have a free opening upon the surface. Take then a copious emigration of corpuscles, consequent upon irritation meeting with no resistance, the difficult expulsion of desquamated epithelium from funnel-

shaped alveoli, which have moreover no inherent contractile power, and add to this, stagnation in the capillaries, and all factors for a common and stubborn disease are given.

In speaking of treatment, of the cure of pulmonary consumption, let it not be forgotten that medicine is not, and does not claim to be, one of the exact sciences. There are now, always have been, and always will be, a large number of well-meaning individuals in the medical profession, whose chief aim and desire it is to bring that branch of medicine which we call therapeutics, into such tangible form that it may be grasped and held unto as a permanent, never-changing guide. The apparent inconsistency between theory and practice, of well-ground knowledge as opposed to the oft-occurring necessity of rapid action, is a puzzle to the laity as well as to many practitioners. The fault lies in the practitioner himself. Here is a science which, while resting upon positive foundations, is in its deeply-rooted principles an undefinable art. Certain well-defined and well-tried facts and principles are inculcated into the mind by teaching and demonstration. This acquired knowledge, however, must be supplemented by individual intuition, by that tact and ready appreciation of the needs of each separate case as it presents itself, which alone is the road to success in treatment, whether it be in general practice or in the exercise of a specialty.

The chief factor in correct comprehension and successful treatment is the individual capacity for giving to each of the three factors of therapeutic conclusion: Fixed laws, empiricism, and hypothesis their due in each case. The safest

road to successful treatment, therefore, is a sort of intuitive fusion of these factors into a harmonious whole, and this is especially and particularly true of the treatment of pulmonary consumption.

A few words in reference to hereditary taint in consumption. The actual disease as such is not transmitted to the offspring. What is really transmitted, is a more or less frequently manifested tendency of the lung to answer every irritation from without or within by the proliferation of pathological products. Further than this we do not know, and never will know as long as we cannot penetrate the mysteries of generation.

Why the note issued by the parents should not become due before the later years of a child's life, is not easily explained. My theory in regard to this matter is as follows: without touching upon the question of inoculability of tubercle, or its transmission by mother's milk, I will say that a child nursed by a consumptive mother does not receive such nourishment as is required for healthy growth. If, on the other hand, it is brought to the period of dentition by the milk of a healthy wet-nurse, or good milk from domestic animals, other things being equal, the blood and tissues of a child should be in a healthy condition. Under ordinarily favorable conditions of life the growth of a child progresses evenly until the so-called "age of puberty" is reached. This period is marked by rapid and often unproportionate growth on the one hand, and a call is made upon nature on the other, additional to that of self-development, to wit: reproduction of the species. It is not much to be wondered at when at such a time the sustaining powers are unequal to

the double task. Nor when any hitch in the performance of the functions of the body vents itself upon that organ whose powers of resistance are hereditarily below the normal.

I am satisfied that an exact knowledge of the physiological eccentricities of the individual disposed to consumption, and the possibility of balancing and keeping in balance during life the exactings of the body and the capacity for performing the same, would result in keeping the tendency to consumption in a latent condition and enable us in many cases to cause its total disappearance.

Of course this tendency, this disposition must have an anatomical basis, consisting in an insufficient construction of the respiratory apparatus, not, however, capable of demonstration previous to the appearance of pathological products. If it could be measured, it would most likely be found in the comparatively insufficient development and capacity of the vascular system as against the lung, or vice versa.

Certain it is, that the longevity of a person disposed to consumption is altogether dependent upon a *favorable constellation of the conditions of life*, which again are governed by pecuniary and other surroundings, and are largely the result of accident.

So much for inheritance and disposition. On the other hand we have acquired consumption, the laws governing which do not differ materially from the hereditary, once it is well acquired. The causation, as you may readily infer, must be more acute, more drastic, because the original power of resistance is greater.

Generally speaking, we may say that all exciting causes and conditions tend primarily to thoroughly disturb the in-

terchange of tissue in the body and this leads to disturbances, which may be dwelled upon under these heads :

1. Impoverishing of the blood, known under the general name of anæmia. As it would be going out of our way too far to go more deeply into this matter, it suffices to state that the blood may be impoverished as to quantity as well as to quality, or both.

2. A decrease in the secretion of the juices necessary for digestion, as a natural sequence of anæmia. Hence imperfect nourishment of muscles and nerves, and of the former, more especially the heart, thus impeding its propulsive force and rendering it flabby.

3. Surcharging of the tissue fluids with used-up material, such as has served its time and should have been mustered out before. This is the prime source of fever, the refuse being cast off septic matter, if we may so call it.

4. Disturbance, unbalancing of the innervation of various organs, manifesting itself notably in irritation of the pulmonary and gastric mucous membranes.

The completion of this string of occurrences constitutes what I term the "fatal circle," and marks the absolute, sinking beneath the physiological line.

By a careful retrospect in a well-developed case of consumption, you will mostly be able to put your finger on the climax, from whence the scales dipped over toward destruction.

OF TREATMENT IN GENERAL.

COMPREHENSION of the pathological processes in consumption and of the treatment based upon such knowledge, has passed through many stages and trials, and even at this day, we cannot speak of an established line of treatment. The management of a phthisical case will ever be a matter of strict individualization. Consumption is curable. In proof of this, we not only point to the results of autopsies, where the shrunken, contracted connective tissue processes point to the original seat of disease, but also to the complete convalescence of undoubted phthisical subjects.

The prime object of all plans of treatment must be based upon an effort to cause a break in the above-named fatal circle, where this exists. The best efforts and skill of the physician will often have to be put forth to determine the proper measures and the proper time for the same.

Consumptives may be treated at home or by sending them to such climates as have been shown by experience to have benefited a greater or lesser number of cases.

In either case, neither local treatment nor the mere change of climate is to be considered as an all-sufficient therapeutical measure.

For in connection with both local home and climatic treatment, attention to the *general condition* is the great sine qua non in pulmonary phthisis.

It may be well to mention here that this is not a historical review, nor a statistical compilation, and hence what has been done since the days of Hippocrates will be passed over in respectful silence, in order to give space and time to the discussion of the therapeutical measures of the present day.

The therapeutics of consumption of the present day rests as nearly as possible upon a physiological basis, though by no means a perfect one.

Now, as formerly, a demand makes itself felt for the direct removal of the local disturbance in the lung by some definite remedy. This craving should be shelved, because the manifest disturbance of the lung is dependent upon and in connection with a number of pathological processes in various other organs. The gradual restitution of these several organs to their normal functions is the primary condition for local restitution.

All rational treatment, therefore, should be based upon the re-establishment of bodily functions and not attention to symptoms, as they present themselves from time to time.

The unfavorable factors, which we are not able directly to combat, are the peculiar habitus of the patient (the sum total of his growth), the continued accessibility of the lung to hurtful influences of all kinds and the impossibility of giving rest to the organ.

What we have to and are able to cope with chiefly, are the decreasing, the *lessening of the noxious influences* on the one hand, and of the ever *present feebleness and depression of the circulation* on the other.

The latter is the great desideratum, not only for the purpose of re-establishing the necessary propulsive force for

sending blood to the periphery, but to stimulate absorption of effete products.

These two requirements have been pretty distinctly recognized at all periods and the efforts to act more or less directly upon the lung in recent years have resulted as follows :

1. Overloading the circulation with lime and kindred salts, with a view of causing tubercle to undergo calcareous degeneration. No scientific facts justify us in assuming any such proposition. The salt, accompanied by the wish that it may make the lung its permanent abode, will be lost in the general mass. If, indeed, muscle would be appropriated by muscle, brain by brain, &c., the most likely place of deposit for the lime salts would be the bones.

2. The use of mineral waters, of which more hereafter. Whenever they are used with the intention of furnishing the fluid parts of the body with liquid sufficient to moisten and encourage the absorption of infiltration, such an attempt is visionary, but not practicable.

3. *Transfusion of blood and milk.* The hypotheses upon which these trials are based are deserving of some respect, as endeavoring to directly enrich the blood by introduction of its own species, or of that which would as nearly as possible represent chyle. But neither transfusion has met with anything but temporary success, for reasons which will be dwelt upon further on.

Direct assault upon a cavity or an infiltration through the thoracic walls with the hypodermic needle, using disinfectants such as carbolic acid; or absorbents such as iodine. In its proper place and at the proper time this treatment has a fu-

ture (thus far unattained), and will be spoken of in the chapter on home treatment.

5. Better results were at one time claimed for the inhalation of compressed or diluted air by the portable apparatus.

This method will be spoken of as one of the closed methods.

As regards remedies for increasing the heart's action and sustaining it at a given point, no such have been discovered. A depressing reaction will follow the prolonged use of all heart stimulants.

* "The various cures for pulmonary consumption that are constantly brought forward, are founded on entire ignorance of the laws of general pathology. Those who are acquainted with these laws, know well how utterly impossible it is for any one of the remedies proposed, for the inhalation of any medicinal substance, or of any amount of compressed air, or for any degree of forced inspiration, to cure a disease such as I have described, one of defective and of lowered innervation and vitality.

"Nothing but an appeal to the laws that regulate the development and preservation of life can have that result. An intelligent application of those laws, as demonstrated by physiology, with the assistance of climate and rational therapeutics, may, however, be made, most unquestionably, the means of saving very many lives."

* J. H. Bennett—Pulmonary Consumption—1879.

HOME TREATMENT.

UNDER the head of "Home Treatment" we will consider all rational therapeutical measures instituted to cure or arrest pulmonary consumption, which can be made use of without resorting to banishment from home, without resource to change of climate.

In order to avoid confusion, I will first present to your view what may be properly termed "closed methods," by which are meant lines of treatment more or less one-sided and exclusive, but with a history of partial successes. Then will follow the "home treatment" proper, beginning with the general condition and the re-establishment and upholding of offending functions; the local treatment of the various forms of consumption, such as catarrho-fibroid, cheesy and tubercular, with their manifestations in the shape of cavity, condensation, &c.; lastly, symptomatic treatment, the unavoidable treatment of urgent and distressing symptoms.

The most prominent, as also the most recent of closed methods, is the *inhalation of compressed and diluted air by portable apparatus.* The theory is a plausible one, being based upon the successes attained by rarefied air at certain altitudes.

Close observations were made, certain conditions of the lung relegated to condensed, others to rarefied air. There

was inhalation of compressed air with exhalation into common atmospheric air, the same with exhalation into diluted air; and inhalation of diluted air with exhalation into atmospheric air. The late Waldenburg and his followers worked out the details for separate lines of treatment for various lung troubles. Effects upon respiration, pulse, and heart's action, as well as the general condition, were noted. Inhalation of compressed air was supposed to have certain direct effects upon the alveoli of the lungs, upon the contractility of the pulmonary capillaries, while diluted air produced in part the opposite effects. The literature upon this subject is very extensive.

Inhalation on this principle is carried on by means of Waldenburg's apparatus and its various modifications, as well as in closed chambers.

The portable apparatus consists either of one or two cylinders containing water up to a certain mark, with a second cylinder closely fitting into it and hanging upon pulleys. Weights laid on top increase the pressure upon the air within. A twenty-pound weight is equal to an increase of one-sixtieth (the most frequently used); thirty pounds for one-fortieth, and so on.

There is no use in going any further into this subject, because it has had its day; which is owing to the fact that it rested upon false premises. I except only symptomatic emphysema and asthma, as conditions in which temporary relief is afforded. For all other conditions the inhalation by apparatus of condensed or rarefied air, of steam or of nitrogen are of value only as *limited pulmonary gymnastics*. An apparatus has this advantage over enforced deep breathing in the

open air, that it fixes the attention of the patient and increases his faith in the efficacy of well-regulated in and expirations. And as such I would not condemn them. Left to his own will to empty and refill his chest in the open air, the patient will soon relapse into indifference and breathe superficially. Even big children must have toys to play with.

But it is as a closed and distinct method of treatment that it is to be condemned. In my opinion the gymnastics are of circulatory and functional value only to the non-infiltrated portion of the lung.

Another closed method is what is known as the "*Salisbury method.*" This is an English invention and signifies no more nor less than the restitution of the general condition, and through it of the shattered lung, by an exclusive diet of meat. It is possible that a meat diet to the exclusion of other nutriment may act favorably by giving rest to the digestive apparatus other than the stomach, and a certain degree of improved nutrition be attained in a comparatively short time. But successes claimed on the score of this treatment admit of explanation on general principles and on the strength of the auxiliary treatment. Besides, the idea of an exclusive diet for consumptives is a superannuated one. Mixed diet is the accepted plan, to the utter exclusion of vegetarians, milk feeders and other dyspeptic misanthropes.

The last of these specific–seeking methods is the at one time much vaunted treatment of pulmonary consumption by the *hypophosphites of lime and soda.* A few years ago the cases cited and cures claimed by Dr. J. F. Churchill of Paris made quite a stir in the medical profession. Without

going into the question of successes from this plan of treatment, I must say that the rationalé of Churchill's method was largely misunderstood and misrepresented. It has been taken for granted, that he sought to overload the system with lime salts ; that it was intended to furnish fuel for the organism in order to save from waste the existing normal tissues.

The rationalé of the administration of the hypophosphites of lime and soda consisted essentially in an endeavor to furnish the nutritive functions with a substance, which Churchill claimed was lacking in phthisis ; that the introduction of phosphorus in readily assimilated shape would arrest the diathesis, thus leaving the physician to deal with an ordinary ulcerating surface or infiltration, not differing from those resulting from inflammatory processes in a previously healthy person. Churchill claims that by the administration of hypophosphites the economy is brought back to its normal condition, from which all the organic disorders have sprung.

You will at once observe that this assumption of a restitution to the normal condition is based upon equally assumed premises, namely that phosphorus was the one element which was lacking in the system.

In order, however, to give you all the light possible upon this subject, I condense Dr. Churchill's own conclusions, as given by Dr. de Brémon of this city : *

First.—There exists in the system, as a constituent element of nervous matter, blood, the muscular organs and of the albuminoid compounds in general, a phosphorous element not yet chemically isolated, and which element is dis-

* Phthisis Pulmonalis and its treatment by hypophosphites, by L. de Bremon, M. D., 1880.

tinct from the previously known phosphatic element.

Second.—This phosphatic element is one of the substances of our economy which has a great affinity for oxygen. Its probable function is not only to be oxidized itself, but also to promote combustion, and perhaps to initiate organic metamorphoses in other substances.

Third.—Diminution of this phosphorous element in the system, whether as the result of its exhaustion (its being used up), or of a failure of reproduction, is one of the essential conditions of the tuberculous diathesis.

Fourth.—The immediate effect of the diminution of this phosphorous element is to diminish the degree of oxidation, necessary for tissue in process of transformation. This has the effect of rendering such living matter unfit to fulfill its function in the system, while at the same time other matter is retarded from being eliminated in an excremental form.

Fifth.—The deposit of this abnormal matter under the form of protein substances, incompletely developed and of variable composition, constitutes the different pathological products known under the name of tubercle, and which are the anatomical characteristics of pulmonary phthisis.

This latter proposition will show you, that the whole method, both in its pathology and therapeutics, is based upon histo chemical assumptions, taking no cognizance of histological (microscopical) pathology.

In justice to Dr. Churchill and his followers it behooves me to add: Many practitioners, who have given the hypophosphites a trial, have made two mistakes.

First—The salts of lime and soda may be alternated, according to the physiogenic or pathogenic symptoms produced

by either, but they should never be mixed.

Second—The doses recommended for general use are too large, surpassing three times the doses given by Churchill as a general limit.

Broadly speaking, fullness and color of the face will indicate the physiogenic effects, and epistaxis the commencing phase of the pathogenic phenomena.

As antipyretics, or better as antiseptics, since the fever of phthisis is a septic one, the salicylates and benzoates are not without use. This is especially true of salicylate of soda and the benzoates of soda and magnesia. They will be spoken of again further on.

We pass now to the consideration of home treatment proper: of the treatment of consumption at home on certain principles which, by no means perfect, have at least the merit of having stood the test of time thus far. This line, or these lines, of treatment are based upon experience thus far attained, partly by indications pointed out by fixed physiological laws, in part by empiricism, and, last and least, upon reasonable hypothesis.

The constant objective point to the careful observer should be the general condition of the patient. In the majority of cases, in the so-called first stages, the "fatal circle" has not yet been established, and yet the general health is decidedly failing. The great indication, then, is the *re-establishment and upholding of offending functions.*

In hereditarily predisposed cases, the chief offending function is usually the circulation—the heart and its distributing channels. Muscle and nerve are the two tissues of highest development. Imperfection in the development of nervous

centre is not always capable of detection or demonstration. But in the case of muscle, the size, consistency, and color are points to judge by. In the case of the heart, its development may have been imperfect at birth, or, what is oftener found to be the case, its growth does not keep pace with the development of the body. Thus we find in rapidly growing young people a heart, the size of which fails to correspond to the requirements of the dimensions of the person; the consistency of which is flabby, its color pale, and, as a consequence of the whole, its propulsive power not up to the normal standard.

As stated on a previous page, no remedy exists which will persistently keep up the action of the heart or strengthen its muscular fibre. This must be brought about through nourishing the muscular tissue by the *digestive road*, and more especially *by exercise*.

The realization of the replenishment of the vital fluids by food being a slow one, often too slow to keep pace with the destructive process, has led to the direct introduction of blood into the vessels, to be transmitted to the heart, and from thence to the tissues. We have before stated that the results of this proceeding have not justified the method. It would probably make no difference as to whether the blood was defibrinated and warmed, or passed directly from the arm of a well person to that of the patient; no difference as to whether it is introduced into a vein and carried primarily to the heart, or into an artery and taken directly to the tissues; nor do I believe that any quantity, be it small or great, need be fixed upon as the proper one, as long as it is done with sufficient care and slowness.

The trouble seems to lie in the flabbiness of the heart itself. The muscular weakness of the heart is not able to cope with the quantity of blood already on hand, much less with the augmented quantity. The result is not permanently increased propulsive power, but an attempt thereat, followed by depression and decreased contractility, with consequent stagnation in the capillaries and in vessels of lesser calibre.

The above facts hold true also as regards the transfusion of milk. Food, whether liquid or solid, must be introduced into some portion of the alimentary canal, and join the blood by the natural routes in order to be of any use as nutriment.

The blood and tissues of the body, and with them the heart, must first be strengthened by food. When by judicious feeding and exercise the heart can be depended upon as to propulsive power and rhythm, the gradual introduction of human blood by transfusion may be resorted to with less risk and a far greater possibility of success. Neither others nor myself have had any experience as to this proceeding, when practiced as suggested, but I should think it feasible.

Food: What constitutes proper food for consumption is a well settled question. A mixed diet is the correct thing. Nitrogenous materials and hydro-carbons should equally be given; likewise fluid as well as solid food. Broadly speaking, there are only three kinds of solid food: Meats, vegetables (including fruits), and bread substances (all-flour-yielding substances and their products).

Certain rules should be observed with regard to the prescribing or recommending of food.

First.—Let the patient state his likes and dislikes, what

agrees and what disagrees with him; do not force him to eat things which may happen to agree with you or your friends.

Second.—But this choice of the patients must not be limited to one kind of food. There exists frequently a dislike for meat and a preference for the starchy substances. If he insists upon a positive dislike for meat or some other form of nutriment, his digestive apparatus should be made to correspond to the normal condition, of which more directly.

Third.—It is often best, no doubt, to recommend the patient to eat light meals at more frequent intervals, but this is frequently not feasible and irksome. But the patient must be positively instructed to eat very slowly and to chew his food very finely, even if he has to place a watch in front of him to time himself, until he has acquired the habit.

Exercise: As a remedy for increasing the muscular strength, the propulsive power of the heart, exercise stands uppermost in my opinion. Here also the ability of the patient to undergo exertion is best judged by himself in the beginning. Females often show a great unwillingness to exercise in the open air, and need much encouragement. Exercise on foot is, on the whole, the best of all. The patient must be told to walk slowly, head erect and shoulders thrown back, because an attempt to walk briskly results in his stooping over in front. A constant reminder of the necessity of walking erect, as well as a silent companion, is a cane. As a diversion and reminder the cane may be carried in both hands in front of the body and occasionally passed through the elbows behind the back. After a patient is able to walk about two miles without fatigue, he should undertake to

climb to a limited extent, where the nature of the surrounding country is undulating or hilly.

While walking, the patient should as frequently as possible (say every ten or fifteen minutes), take deep in—and expirations without straining, from six to eight times in succession; which act completely empties and refills the lungs.

The importance of knowing how to breathe, cannot be overestimated. No line of treatment, at home or by change of climate, should be inaugurated without thorough instruction in lung gymnastics, in the mechanism of breathing. Until you have paid close attention to the subject for a number of years, you will never know how many human beings do not know how to breathe and through which organ to breathe. Respiration, this most important of all functions of life, is by some carried on superficially, by others perverted and contrary to physiological requirements.

Breathing is a function, which should be exercised *slowly and profoundly*, a requirement which can only be fulfilled by breathing through the nose. Breathing through the mouth leads to superficial and often rapid breathing; still oftener to snapping up of air.

Dr. Clinton Wagner says: *

"The air, in its passage through the tortuous channels of the nose, is raised to the temperature of the body before it reaches the larynx; this can easily be demonstrated. On a cold day, let one breathe through his mouth in the open air; the sensation of cold will at once be felt as far down at least as the larynx, and an irritating cough be induced. No matter how low the temperature may be, the sense of cold is

* Habitual mouth breathing. By Clinton Wagner, M. D.

never experienced below the border of the soft palate, so long as breathing is carried on through the nose with closed mouth.

Let me remind you again that the function of the lung is a passive one and the result of the combined labors of the other organs, and you will have an idea of how a neglect of this performance may lead, not to local disturbances only, but disturbances affecting the whole organism. This because the introduction of oxygen for burning purposes and the exhalation of carbonic acid, representing in part the effete products; this introduction of air is not "food for the lungs," but for the organism at large.

With persons moving about in the open air the act of respiration is in a measure performed promptly, without cognizance being taken of it, as a result of active motion. But for the great majority of city people, whose occupations require them to sit or stand for from eight to sixteen hours a day, it is absolutely requisite that they should accustom themselves to frequent full and deep inspirations.

Horseback riding has no particular advantages. Only a limited set of muscles are brought into action, and the heart's action is apt to be subjected to irregular impulses.

Carriage riding is beneficial in cases where the patient is not yet strong enough to walk. It is also of service when it is desirable to remain in the open air for a length of time exceeding the time a patient would be able to walk, and is on the whole to be preferred to sitting still without motion. Rowing is not to be recommended, nor any form of gymnastics in which the pectoral muscles are likely to be put upon the stretch. I have seen hemorrhage occur in a

convalescent from such a slight cause as the sudden checking of a a gentle horse, while driving.

Lung gymnastics proper should be carried on in the open air, while walking or standing still, or in a well ventilated room. The exact limits to which actual gymnastics should be carried on at home or in a gymnasium, often tax the best judgment of the physician. Nearly all gymnasial performances require more or less severe straining of the pectoral muscles and sudden calls upon the heart for increased action. House gymnastics may be carried on by movements of the arms and legs, as well as the body, with or without the use of a long stick or pole; by the use of light Indian clubs for both of which kinds of exercises a variety of pamphlets are published in several languages, and made easy by illustration.

Deep inspirations, always without muscular strain, are the chief point aimed at in connection with the development of the muscles of respiration. There are a few movements preferable to others, on account of their efficacy and simplicity and because the patient is not so apt to tire of them.

I know of none better than the following: Stand erect, toes out; while slowly inspiring, raise the hands above your head until the palms meet; then reversing the hands, drop them slowly to the side while expiring. Repeat this six or eight times in succession. In addition to filling the lungs, the movement teaches the patient to respire slowly and profoundly.

Or let the patient walk into one of the corners of his room, with his arms horizontally extended, and while slowly inspiring, endeavor to get his face into the corner as nearly as possible.

Whatever movements are made, three points must be kept in mind :

First—Inspiration must be made slowly and profoundly, ordinary breathing being resorted to for a time after some eight inspirations have been taken.

Second—The passage from in—to exspiration should be gradual and not snapping.

Third—No muscular tension. which is felt to be a strain, should be indulged in.

So much for the various methods by which the heart and circulation and through them our flesh, the muscular system, are to be brought up to the required standard.

The next apparatus to claim our attention is the digestive one ; which, while found offending, is often more sinned against than sinning. There are instances of an hereditary insufficiency of the digestive organs, oftenest found in infants whose life is thereby shortened and of whom we say that they are "not visible."

This tendency is probably never entirely outgrown, and as a consequence we have adults who digest certain kinds of food more readily than they do others. Some relative inequality in the development of the organs assisting in digestion, either in size or in their blood supply, doubtless exists, factors which as yet we are not able to distinguish. Or one part of the digestive process is carried on satisfactorily, while the other halts and limps ; the stomach may be all right and the bowels sluggish, or vice versa. In either case the balance is destroyed and it is this we are called upon to rectify.

By far the most frequent disturbances, however, are acquired ones. That patient organ, the stomach, has been abused and insulted and is in rebellion.

Let it be set down as a rule in the pathology of phthisis: *Individuals who have destroyed the balance between their functions repeatedly and thereby have been dragged below the physiological line, often need only the impulse of an acute gastric catarrh, to develop at once one of the forms of lung trouble which sooner or later assume the common characteristics of consumption.*

It follows, therefore, as an imperative law that all hereditarily vulnerable patients, as well as those whose constitution has become shaky by deviations from the normal conditions of life, should be impressed with the fact that every gastric disturbance, however small, must be promptly met and corrected.

The scope of this work will not allow one to go deeply into the numerous disturbances, which the alimentary canal is liable to, for this would in itself fill a volume. It will be my endeavor to point out the leading facts, and likewise salient points in treatment, as concisely as possible.

The condition of the teeth should be looked into, and, if necessary, remedied. Practically, and for our purposes, we may look upon disorders of the stomach in connection with lowered vitality (as is the case in consumption) as twofold:

First—Lack of vascularity, of proper blood supply, and, in consequence, insufficiency of the gastric juice, both as regards quantity and quality of admixture.

Second—Lack of innervation, largely dependent and consequent upon the failure of vascularity (gastralgia) and spasmodic contractile action or lessening of sensibility and paresis. In the first instance we have hyper-sensitiveness, and vomiting; in the second, and by far the most frequent,

dull, heavy feeling; partial paralysis, with dilatation of the stomach. The result is slow and imperfect digestion, which means fermentation, and the development of gases.

The indications, broadly speaking, are then:

To replenish the blood, and, partly through it, partly through artificial means, to restore tonicity and contractility to the unstriped muscular fiber of the stomach.

The first indication, that of replenishing the blood, is to be met by careful introduction of food into the stomach or rectum, or both.

In cases of pure gastralgia, intensity of pain, giving evidence of neuralgic trouble, the careful hypodermic injection of morphine (gr. 1-16—1-8) over the region of the stomach once, or perhaps twice a day, will prove very successful.

The paralytic condition of the stomach is dependent upon its innervation, and this again upon blood supply to the sympathetic centres. While improving the condition of the blood, both as to quantity and quality, we can aid tonicity and contractility of the stomach by the administration of nux vomica and its alkaloid, and by the Faradic current.

Nux vomica may be used in powder or in the form of the tincture, and is on the whole preferable to strychnia. The latter may be, however, advantageously applied hypodermically over the region of the stomach, in doses not exceeding 1-24th of a grain.

Good results are obtained by the daily use of the interrupted current.

Let me give you a few formulæ of combinations of the above-mentioned remedies, which have proved useful in my hands:

℞

Lactopeptini
Pepsini sacch. ad ℈iv.
Pulv. nuc. vomic. ℥ss.
M.f. pulv. Div. in chart viii. S. 3 times a day after meals.

℞

Bism. subnit. ℥i ss.
Pepsinæ, ℥i ss.
Strychn. sulph. gr. i.
Tinct. cardamom. comp. ℥iv.
M. S. Teaspoonful 3 times a day in water.

℞

Acid. muriat. dil. ℥v.
Tinct. nuc. vomic. ℥ss.
Infusi gention. comp. ad ℥iv.
M. S. Teaspoonful in water after meals.

℞

Pepsini (Samarsch) ℥iii.
Glycerini puri ℥i.
Acid. muriat. dil. ℥i ss.
Aquae ℥v.
M. S. Tablespoonful in water every 3 or 4 hours.

In regulating disordered conditions of the stomach, of course liquid food will have to be resorted to for a few days. As soon, however, as the patient is able to take more or less solid food, the liquid fast should be broken, as the strength often falls off rapidly. Digestion of the food partaken of,

should be actively aided by pepsine, lactopeptine with nux vomica, and perhaps antacids. Acids are good with or without pepsine, and their utility is best determined by the thirst of which the patient may complain.

A mercurial purge is never indicated. Whenever a condition is somewhat protracted, or having disappeared once, shows a tendency to sudden re-appearance. a golden rule is to be remembered : *Change the form of the remedy and alternate by changing the remedies themselves.*

A wet compress worn over the region of the stomach or over the whole abdomen at night, is very serviceable. A dry one (so-called belly bandage), is an equally excellent prophylactic against recurrent catarrhs of the alimentary canal, for those who are subject to them.

The liver and other secreting glands need no "touching up," but should be left alone.

Constipation of the bowels is an oft occurring drawback to re-establishing the general condition. Never prescribe for constipation before ascertaining whether food is properly digested on the one hand, and whether any pathological condition of the rectum or the colon exists, which can be ascertained by inspection and palpation. I need merely mention fissure of anus, hemorrhoidal knots, atony of the colon and rectum, stricture of rectum, the presence or neighborhood of abscess or already-established fistula in ano, fæcal impaction, neuralgia of anus or rectum.

Enemata, mild laxatives and the Faradic current are all of use in certain conditions. The current is an excellent remedy, where there is sluggishness, a lack of tonicity of the large bowel.

I append such cathartics and remedial measures as never act too drastically. The indication for their use must be left to individual judgment :

1. Tamar Indien—a French confect—chiefly condensed extract of senna leaves.

2. Tropic fruit laxative—an American preparation of similar composition.

3. Karlsbader salt—condensed from the springs at Karlsbad (Sal. therm. Carol. natural.). Teaspoonful in one-half tumbler of warm water upon rising.

4. Artificial Karlsbader salt—a mixture of bicarbonate of soda, chloride of sodium and sulphate of soda.

5. Enemata – best with a fountain syringe.

6. Faradic current—to rectum and abdominal walls.

7. Pulvis liquirit. comp. (German Pharmac). Dose : One teaspoonful.

8. Compound cathartic pills. One or two at bedtime.

9. Glycerine. Tablespoonful with lemon juice.

10. ℞

Aloin

Extr. nuc. vomic.

Extr. belladonnæ aa gr. vi.

M.f. pilul. No. xii. S. One to two pills a day.

11. ℞

Podophyllini gr. 1-4—1-2.

Atropiæ gr. 1-80.

Pulv. aloes gr. ii.

As a pill at night.

12. ℞

Extr. colocynth. comp. gr. ii.

Pulv. rhei gr. i.
Extr. belladonnæ gr. 1-4.
Extr. hyoscyami gr. 1-2.
As pill at bedtime.

Whenever digestion is sufficiently restored, either food and drink may be relied upon alone or the preparations of iron may be called into aid. In their administration three things must be kept in mind :

First—Commence with small doses and increase rapidly.

Second Change the form of the remedy about once a week. The saccharated carbonate of iron is a good form to begin with.

Third—After giving iron for some time, say two months, allow a week or ten days to pass before beginning again, to avoid any intestinal irritation.

Some of the best forms of iron are here appended, and should be administered in accordance with the rules mentioned above.

1. Ferri carbonas, sacch. with lactopeptine.

2. Ferri carbon. oxyd. with saccharated pepsine. To either of these, subnitrate of bismuth or pulvis nucis vomicæ may be added when required.

3. Ferri ammonio—citras in infusion of quassia or calumba.

4. Ferri et potass. tart. in infusion of cascarilla or gentian.

5. Ferrum dialysatum—with plenty of water.

6. Ferri sulph. exsiccat.
Potass. carb. puri ad ℥iii.
Mucil. tragacanth. q. s.
M. f. pilul. No. 60. S. 3 pills 3 times a day.

7. Tinct. ferri percblor. M. x.
Liquor, ammon. acet. ℥i.
As a dose 3 times a day.

8. Tinct. ferri muriat.—from five drops rapidly increased to sixty. Small doses of quinine may be added. Lemon syrup or syrup of wild cherry bark are excellent adjuvants.

9. Ferrum lacticum—a German preparation. Alone or with lactopeptine.

10. Ferrum redactum (iron reduced by hydrogen). In pill form with the coldly prepared extract of cinchona bark.

11. Ferri pyrophosphas—with stimulating expectorant syrups, such as tolu, prunus virgin, or armoracia.

12. Tinct. ferri pomati—a German preparation. Begin with 15 drops to one-half drachm.

13. Mistura ferri composita (U. S. Dispensary)—a mixture of sulphate of iron, carbonate of potash, myrrh and spirits of lavender.

The two last-named preparations are useful in the chlorotic condition of females, with whom they generally agree well.

This appears to be the proper place to speak of such nutriment and other substances as hold a medium rank between fluid nutriment and actual medicines. Milk has always been held to be more or less indispensable in the treatment of phthisis. It has been insisted upon as the nutriment par excellence in large quantities, but as such has not proved as valuable as was expected. This, I think, admits of an explanation. Milk stands at the head of all nutriments while the stomach is unable to cope with solid food. The indefinite continuance of milk as sole article of food, to the

exclusion of what the stomach is able to bear, reduces the digestive apparatus to its juvenile condition, physiologically speaking.

Besides there are a great percentage of patients who cannot digest even fresh cow's milk. In such cases it is well to give it in some other shape, such as milk punch or egg nogg, or it may be given cold. But it will not do to force them to take it against their previous experience. Those who can drink it should drink it slowly, and rather between than with meals. The quantity can only be regulated by the capacity of the individual. From five to six glasses of milk per day I have found to be a good average. It is always of benefit to add a few tablespoonsfuls of lime water to the milk, to guard against acidity.

Goat's milk and asses' milk are both superior to cow's milk as an article of food.

Buttermilk is a product which meets with my approval for its triple qualities of not easily creating acidity, of quenching thirst, and of containing more or less fatty nutriment. Its acidulous taste is very grateful to many patients, and I let them drink it ad libitum, always in small mouthfuls at a time.

Kumyss is another form of milk. The inhabitants of the Kirghis Steppe, in Asia Minor, drink the milk of mares, which is allowed to undergo partial fermentation. It is said to possess intoxicating qualities, but this is probably not true. As a nutriment it is on a par with clabber (the so-called "Molken" of the Germans). In no sense is kumyss a specific. It is a good article of food to alternate with goat's or cow's milk and buttermilk.

Midway between articles of food and actual medicine stands our old friend, *cod liver oil.* This ancient remedy has been both over and underrated many times, has passed through many vicissitudes and changes of fortune, and yet stands its ground, and justly so. Well-clarified cod liver oil is a fatty nutriment par excellence, and in all cases where it is well borne nutrition is rapidly improved. I repeat, where it is well borne! For those with whom it agrees, especially in the cold months, it is a readily assimilated nutriment, and by improving the general condition gains us time for local treatment. The capacity for properly assimilating cod liver oil is not so individual as with other things. A few may be able to take it ad libitum; then it is often to the exclusion of other food. Half an ounce four times a day appears to be the maximum dose.

A word or two about the form and manner of administration. Attempts at disguising must not be carried far. If it is not well borne, by beginning with a teaspoonful twice a day, it had better be abandoned. Children take it best, the juvenile condition being favorable to the ready absorption of fat; old people it rarely agrees with.

The best shape to take it in is pure. The stomach should be encouraged to the extent of adding an alkali, but aside from this no advantage will be derived from adding stimulants. But the taste need not remain in the mouth.

To this end, fixing the teeth in a slice of lemon immediately after taking will answer. Likewise aromatics, such as a mixture of ol. menth. pip. gtt. i., tinct. aurant., 15 to 20 drops, on a lump of sugar.

The best oil comes from Norway, and Mœller's oil has,

and deserves to have, the best reputation. Emulsions of cod-liver oil, with or without the hypophosphites, often prove very useful in treating children. As in all other remedies or articles of food, alternation and an occasional complete cessation are necessary to insure benefit.

Whenever and wherever it is reasonably well borne, the administration of cod-liver oil should form part of the permanent treatment.

During the past few years several articles have been introduced as substitutes for cod-liver oil, and I am sorry to say, none of them have my sanction.

Glycerine is the sweet principle of oils, and in no manner a substitute. In tablespoon doses, it serves to keep the bowels open, and that is the best I can say for it.

Cream will pass. It does not agree with many individuals any more than cod-liver oil, but when mixed with milk (say half and half) its assimilation is rendered easier. Its chief use is as an alternate to the oil a principle in prescribing food and remedies which cannot be too often recommended.

Malt Extract and similar preparations in teaspoonful doses have been lauded to the skies as specific nutriments. They are excellent stomachics, and appear to give tone to the muscular coats to some extent, thus aiding digestion.

Malt extract, therefore, may be used as an adjuvant to liquid food, directly after we have restored the stomach to its normal function. It is upon this principle of furnishing the stomach with a substance readily digested and assimilated that are based the treatment by grapes and by clabber, respectively known as the "Trauben-Kur" (grape cure) and

the "Molken-Kur" (clabber cure) in Germany. The rationale of this line of treatment is readily understood. Laying aside the popular belief in any specificity in connection with either product, we have two articles of nutriment, which fulfil the three requirements of being *easily digestible*, of *keeping the bowels soluble*, and of *introducing a vegetable or animal acid into the system.* The benefits derived from pursuing such a plan are incalculable for so-called hemorrhoidal persons, who suffer from stagnation in the portal circulation. I have long been of the belief that the vegetable acids are of benefit to nutrition, although how and why is more than I can say.

Of light food, to be taken alone when the stomach is incapacitated for a short time, or in conjunction with more solid food, the oyster is to be commended.

Rectal alimentation will prove very satisfactory, in cases where the stomach is compelled to take a vacation for a greater or lesser length of time. Especially is it to be commended, where loss of appetite appears almost insurmountable; by no means a rare occurrence. In so-called third stage cases the stomach is in the same condition as regards vascular supply and innervation as is the heart. Its function is, for the time being, absolutely suspended. Nowhere does my principle of changing the route by which food and medicines are administered apply more aptly than in substituting rectal alimentation for that by the stomach until such time as the latter may be relied upon to resume its function.

Note, however, that under no circumstances should the stomach be left entirely without at least a small supply of liquid food, for more than the very limited period of a few days.

Nutriment administered by enemata must of course be of a liquid character. The quantity injected at one time had better be limited (four ounces is sufficient), and the enemata preferably given more frequently. In addition to or as a substitute for liquid food *defibrinated blood* may be used to advantage. Personally I have had no experience with it, but in the Presbyterian Hospital in this city these enemata have been given with the reputed advantage of gain in weight and improvement of general condition, to the extent of ability to take food by the stomach, after that organ had lain idle for months Blood being the chief of nutrient fluids, as regards its composition, this addition to our feeding catalogue must be welcomed, because it is quite rational.

Defibrinated bullock's or lamb's blood may be injected in four oz. quantities at bedtime. Why only "defibrinated" is not clear to my mind.*

Having said this much about digestion and the consequent improvement of the condition of the blood, we come to a system, the function of which is largely and almost entirely dependent upon its proper nourishment by the circulation, namely, *the nervous system.*

Some hitch in the functional performances of the nervous centres, depending upon some imperfect anatomical development of the same, or its physiological relations to the rest of the body, is no doubt a more prominent cause of disease than we will ever be able to demonstrate. Tempting as is this subject we must not stray so far from the object aimed at,

* For further results gained and hints as to the proper preparation of blood for rectal alimentation, you are referred to an article by Dr. Stewart, of this city, "A New Method of Rectal Alimentation. (*Medical Record*, Jan. 3d, 1880)

as to dive into etiology too deeply. For our therapeutical purposes it is sufficient to know and to hold on to two facts:

First.—Functional disturbances of the heart, of the digestive apparatus, and of the lungs themselves are often and largely dependent upon disturbances of innervation of these organs, and,

Secondly.—The nervous centres are practically dependent upon the circulation and the nourishment they derive therefrom for the proper performance of their functions.

There is no doubt in my mind that disturbances of innervation of the respiratory organs, or of the heart, or both, are prime factors in the development of pulmonary phthisis. Whether these changes affect the mechanical labor of the lungs, causing irregular and superficial breathing, or directly affect its nourishment through vasomotor influence, are questions we may approximately guess by exclusion, but not definitely determine.

Earnest searchers have endeavored to aid certain forms of consumption by what they called "correcting the great sympathetic nerve centers." But up to date in the treatment of phthisis the condition of the nervous system is best treated by improving the general condition and keeping down any irritation, which latter point will be spoken of under the head of symptomatic treatment

The *functions of the skin* may well follow here, as partly dependent upon nervous influence, both as to general sensibility and the behavior of the surface capillaries. As the mucous membranes are the inside recipients of all kinds of insults in the shape of noxious gases or vapors, hot, cold, or corrosive fluids, so is the skin the outside recipient of

most of the influences which result in what are known as "colds."

The healthy skin of a normal individual should be able to cope with sudden changes of the temperature of atmosphere and water, both as regards the nervous sensations and the accommodation of the blood vessels by proper contraction and dilation.

But we find in the vulnerable individual (not improperly called thin-skinned) a fixed impossibility to answer an assault by virgorous reaction. This capacity for equalizing these factors begets recurrent internal congestions, usually under the form of catarrh. Under such conditions the skin may also be properly considered as an offending "function."

Is it desirable that a consumptive should endeavor to "harden" himself? As a general rule, yes. But strict individualization here becomes imperative, as to how and when the surface of the body should receive attention, and I will then endeavor to lay down certain rules which may serve as a guide to the otherwise discriminating physician.

Of clothing nothing need be said, save that it should be appropriate to the season. Thin, intermediate, and thick sets of underclothing are none too many for consumptives at various seasons.

The subject of bathing or washing the surface for cleanliness, or for the purposes of improving the tone of the capillaries and through them sensation, is one in which, as I have said, the physician must strictly individualize.

Where the disease has so progressed that the "fatal circle" exists, it is best not to tamper with the general surface of the body until septic influences have been brought under control.

In all cases where the patient suffers from an offending organ, let that function first be re-established. These factors not existing or being dealt with, there can be no objection to deal with the skin. If a set of rules are preferable to dependence upon individual judgment of the practitioner, I will say that the temperature of the water used, the length of time spent in application, and the subsequent friction or bodily exercise should be governed:

By the previous experience of the patient.

By the strength and regularity of his pulse and heart's action.

Governed by these, we have a long list of baths to choose from. For the purposes of cleanliness a bath once a week is sufficient. For rendering the surface capable of resistance, daily or every second or third day, to be determined by the increased strength of the patient and his general sensations.

Salt-water bathing (sea bathing) is the most preferable in warm weather. From a quarter of an hour to twenty minutes is amply sufficient.

Tub-bathing in salt or fresh water, with a temperature of 70°. Ten minutes is long enough. If a cold shower be added, let it be on the spine and for about five seconds only.

A Russian bath consists in your being immersed in steam.

A Turkish bath is based upon the more rational theory, that dry heat is apt to call forth a more active hyperæmia of the skin than through relaxation of the skin by vapor.

Anointing the body with olive oil, or other oils, after a bath is the idea of the Roman bath, and, if compatible with cleanliness, should be encouraged as a promising aid.

After any bath a brisk walk is a great auxiliary in keeping up the healthy action of the skin. The only time to avoid this is when a more or less cold wind of considerable velocity prevails, which is likely to cause a too rapid evaporation from the surface of the body.

Local application of water to the thorax will be considered with the various forms of phthisis.

Having already pointed out the necessity of patients breathing pure air, it is scarcely necessary to mention that the same necessity exists at night. Endeavor by all means to eradicate from the minds of your patients two old notions.

The first is that "night air is injurious; the second, that to ventilate a room is to "create a draught."

* "Very few persons seem to know, and most of those who do know seem to entirely forget, what respiration really is and means. We inspire and expire, say on an average twenty times in a minute, which is one thousand two hundred inspirations in an hour, and twenty-eight thousand times in the twenty-four hours. Thus two persons sleeping for ten hours, in a room with the doors and windows closed, make between them more than twenty thousand inspirations and expirations. At each average inspiration and expiration some twenty-five cubic inches of atmospheric air are taken into and emitted from the lungs. At each inspiration we extract oxygen from the atmosphere; at each expiration we throw out carbonic acid and other offensive products of decay. According to Lavoisier and Sir H. Davy the quantity of carbonic acid gas breathed by a healthy man is thirteen thousand four hundred and fifty-three inches, or about six hundred and thirty-six grains of carbon per hour, or eight ounces

* Bennet, Pulmonary Consumption, pp. 41 and 42.

in the twenty-four hours! Think of the condition of a moderate-sized room inhabited during the night by two persons, the doors and windows shut, as is usually the case, after these twenty thousand inspirations have been taken and nearly thirteen thousand four hundred and fifty cubic inches of poisonous gas have been thrown into its atmosphere!"

Of course in mid-winter it is not always easy to change the air and at the same time keep it at a given temperature of from 50° to 60°, but some little ingenuity in the way of utilizing doors and windows makes this possible.

Last but not least, so far as female are concerned, the uterus turns up as an offending organ. *Every female consumptive should be carefully examined as to the condition of her genital organs.* It is in connection with and malpositions of the womb that you will find those cases in which the general break down is at the bottom of and superior to the local disturbances in the lung.

You can readily imagine that a continuous flow of albuminous material, as in fluor albus, from any cause, is a constant drain upon the system, second only to copious expectorations from cavities. In such cases it is always well to call a gynoecologist of good repute in consultation.

Having now sketched the treatment of the general condition and the correction of offending functions, more or less applicable to all cases alike, we come to look upon the necessity of more active interference in those numerous cases in which the "fatal circle" is complete and must be broken through at some point before any other measures can be instituted.

The component parts of the "fatal circle" will bear repeti-

tion: Impoverishing of the blood; reduced secretion of the digestive juices; unbalancing of innervation, and charging of the tissue fluids with effete material. The three first factors may be borne with impunity for a long time, but the arising of fever consequent upon the presence of refuse, calls for immediate action. Our knowledge of the subject permits us to assume, that fever is caused by admission into the blood of heterologous materials, the action of which we may look upon as a sort of fermentation process. How much is due to the quantity of noxious material present and how much to the specific character of the same we are not able to determine. Pus from cavities produces one kind of septic fever; effete material from the body another (the so-called aseptic fever of Volkmann).

According to Volkmann, true septic fever is caused by absorption of truly putrid and poisonous matter, such as pus from cavities. To this I add disseminated tubercle as heterologous material from anæmia necrosis.* In aseptic fever the offending cause is material not essentially different from that which is formed by physiological, retrogressive metamorphosis of tissue, which in the normal condition leaves the body. The probability is that we have here an absorption of corpuscular particles little changed from the infl. periphery of cavities or of connective tissue proliferation, similar to the simple inflammatory fever. This is not proven, but looks like a very plausible hypothesis.

The indication, then, is to counteract this septic influence, either by antiseptics or by correcting one of the other

* The explanation of this will be found in my publication "On the Present Status of the Pathology of Consumption."

factors in the circle, or both. The old rule here holds good that it is best to overcome fever before attending to the general condition otherwise.

Quinine of course stands at the head of antiseptics. The term "antiseptics" ought to be abolished. The best shapes to administer it in are the muriate and the bisulphate, and a good word may be said for the benzoate; and the best form of administration is the pill. Solution may be given with acids; powder in starch capsules. In solution it is well to combine quinine with a vegetable acid: tartaric acid, citric acid, salicylic acid.

Large doses at the right time are preferable to small and frequent ones. Ascertain the time of day when the temperature is highest, and administer a dose of from ten to twenty grs. about three hours before, according to the height of the temperature.

As a remedy to keep up the effects of quinine and keep down the temperature, as well as a tonic, I can speak highly of the infusion of yellow or red cinchona bark.

Before speaking of other antiseptics I wish to impress it upon your mind that the stomach is absolutely to be consulted as to the possibility of retaining quinine. *Do not add the fever of a gastric catarrh to the already existing condition.* In such cases it is sometimes better to assist digestion by means already mentioned, though this will not keep you from using quinine as a suppositary, or even by inunction into the armpits, or even hypodermically in the shape of the carbaminate (muriate of quinine with urea):

Other antiseptics are the salicylate of soda and the benzoates of soda and magnesia.

Before saying one word about these or any other remedies, let me distinctly aver that no remedy, antiseptic or otherwise, is supposed to or will act as a specific.

You know that many remedies in turn have enjoyed that reputation and that all have failed, for the reason that there is nothing in chronic lung processes to vent their specificity upon.

Salicylate of soda will do as a substitute for quinine, when the latter cannot be taken. The patient's dislike or disgust for quinine is enough to render it useless in such a case; there need be no "special idiosyncrasy." This long word and "disgust" are identical. The dose of the salicylate is from gr. x. to ℥i., three or four times a day. I am quite aware that larger doses have been given by those who will never learn that there is such a thing as a limit to quantity so far as the stomach's willingness to digest is concerned. Salicylate of soda may therefore be given:

First.—When quinine cannot be borne.

Second.—When quinine has been given and is no longer effective.

Third.—When temperatures are not very high, yet more or less continually above the normal.

As stated, when speaking of the administration of iron, the frequent change of form of the remedy and of remedies themselves is a powerful adjuvant in the hands of a skillful physician. Another factor which experience has taught me to value, is change of the route by which a remedy is to be given: By the stomach, rectum, hypodermically, by inunction, by inhalation.

I mention these facts here, because they seem to partly

explain the successes claimed for such remedies as benzoate of soda, and may in future point the way to a still more rational treatment of the various forms of consumption.

Premising this much, I will say that the benzoates have not had a thoroughly fair trial. Used in various forms, alternating with other antiseptics, making use of various routes, or using two remedies by as many different routes, is a plan of procedure upon which I am now at work, guided however only by rational principles. It is in this way that general and local treatment may be combined. The injection directly into cavities or infiltrated parts of the lung may not prove a hopeless method, when used in conjunction with therapeutical measures, such as I have here hastily sketched.

Hypodermic injection of antiseptics instead of per orem, or in conjunction with remedies given internally, is a rational method. To my knowledge it has not been systematically resorted to in the fever of phthisis, though I have made a few trials in that direction. A two per cent. solution of carbolic acid is perhaps the most serviceable. From three to six syringes full per diem might answer well, perhaps with quinine or salicylate of soda by the mouth.

So far our efforts in counteracting sepsis by antiseptic remedies and thus cause a break in the "fatal circle."

I have before pointed out that we might often find it best to turn our attention to the nutrition of the body at once. In doing this we attempt to reach the same goal by resupplying as much as possible of the albuminous waste. This restoration may be profitably combined with antiseptics, in doing which we are to be governed by the height of the

fever and the consequent necessity forced upon us of using antiseptics.

There is one remedy, which fills in some measure the requirements of a stimulant, nutriment, and antiseptic. This remedy is *alcohol*, in its various forms of fermented and distilled liquors. No space can be given here to the old discussion as to its virtues other than medical. All objections to its use are more or less based upon moral principles.

Consumptives suffer from irritable weakness of nearly all organs, and it follows that their nutriment, whether solid or fluid, must not be monotonous and non-stimulating, but, on the contrary, *carefully stimulating*, if I may so express myself.

* "It certainly is a fact, that through the decreased secretion of gastric juices, of hydrochloric acid, of pancreatic and intestinal juices, as well as of bile, very little albumen, little fat, and more of hydrocarbons are digested. But the ability of the gastric juices to form peptones is not entirely lost even at the height of the disease; it is only diminished. From this it logically follows, that for moderate quantities of albumen, quantities in proper proportion to the secreted juices of digestion, the means of transformation are at hand; and likewise that after absorption these same means can be and will be reformed upon demand. It is only necessary therefore to proceed with caution as to form, quantity, and time, in order to bring about the digestion and absorption of a quantity of albumen with impunity."

Now let it be understood that to re-supply a want in conformity with the capacity of the assimilative apparatus to take

* Deltweiler; Behandlung der Lungenschwindsucht.

up the same, is not feeding a destructive process, is not adding fuel to the flame, but rather pouring oil upon the troubled waters Like the oil and water the destructive and assimilative processes will not mix. You may rest assured, the feverish process will acquire the necessary burning material with the force of a natural law and that the introduction of nutriment will by no manner of means increase it.

Having disposed of adipose tissue, the destructive process next vents itself upon the red blood corpuscles, causing their downfall en masse, producing numerical atrophy (Vogel), and then follows the readily perceptible disproportion between loss and restitution. For having disposed of the above, it next splits the albumen of the general tissues. It may therefore be set down as a rule absolute that an at least partial restitution of the consumed albuminous material becomes an imperative duty.

So far as consumptives are concerned, alcohol should never be given in quantities which produce its baneful effects of dizziness and of excitation, followed by depression. Now alcohol in proper doses is not only a stimulant to the digestive powers ; it is an excellent fuel, disappearing entirely in the body, it arouses the central nervous system through the medium of the circulation, which is in itself moderately accelerated, as also is the heart's action ; and above all it slightly reduces the temperature and slackens the too rapid changes of tissue.

It therefore helps to preserve intact the existing tissues, while aiding digestion in replenishing them.

Alcohol is to be given in small quantities and at such intervals, as will insure immunity from after disturbances of

the stomach, of the action of the heart and of the brain.

A pleasant subjective feeling of warmth and a slight stimulation of the general condition should be aimed at.

Alcohol is best given in the shape of Wine. Brandy and good Bourbon Whiskey have their uses also, but those uses are concomitant with accidents, with sudden and often unforeseen occurences, which will be spoken of under the head of urgent and distressing symptoms.

Red and White Wines are equally suitable. Of Red Wines the best for our purposes are : Burgundy, the Hungarian Wines Assmanshaeuser, Oberingelsheimer. Italian Wines. Native :—California Port, Virginia Seedling.

Of White Wines : Johannisberger, Rolaender, Binger Eiseler, Forster Framiner, Braunsberger and others.

Native ; Ohio Catawba, Missouri Catawba.

Champagnes : Mumm, Moet et Chandon, Piper Heidsiek, Dry Verzenay, Veuve Cliquot.

Our Native Champagnes are not good.

It has been my endeavor to lay down the proper treatment of cases in which the "fatal circle" is complete, without overloading the subject of therapeutics. It remains to be said that the fever being under control, the line of treatment pointed out in regard to the general condition is to be resumed.

The third part of our subject is the *local treatment* of the lung process.

In general, all fully developed cases of consumption may be considered as a unit, so far as progress is concerned.

Likewise so far as the treatment of the general condition and of the fever is concerned. This is because it is fair to

presume, that two or three pathological elements are combined in cases which have not shown an active tendency to restitution. Newly formed as well as partly contracted connective tissue, cavities from the size of a pea up, dilated bronchi, chessy indurations and tubercle ; all may be found in greater or lesser proportion.

But on the one hand we have cases in which one of the pathological elements may decidedly predominate, on the other it appears practicable to divide cases into headings according to clinical characteristics.

The pathological products present in those cases are, roughly speaking ;—

First : "Catarrh of the Apex" so-called

A slowly spreading proliferation of connective tissue with partial consolidation and the secretion of tough muco-purulent matter from the mucous membrane of the bronchial tubes.

Second : Extensive consolidation of lung tissue, in which the dominant products are diffused hyperplastic and partly contracted connective tissue, chessy foci and bronchietasis.

Third : Single, superficial and circumscribed cavities with little inflammatory conditions in their periphery; well defined cavities, so to speak.

Fourth : Cavity with extensive infiltration of the surrounding lung, or multiple cavities of various sizes.

Absorption of newly-formed connective tissue is never to be thought of. It cannot be done. The best result attainable, consists in bringing the chronic inflammation to a standstill, to check the further development of connective tissue and to encourage the existing hyperplasia to firm contraction.

A great deal of misapprehension still exists as to what can be accomplished in the presence of an infiltration, denoted by dullness and partial or total absence of respiratory murmur, and of râles in place of it. There is often an endeavor on the part of the physician to get rid of the last remnant of dullness remaining, when once his efforts have been crowned, by lessening of the dull area. These efforts are laudable, but the prescriber should be clear in his mind as to what he has accomplished and what is not within his reach.

Every proliferating centre of connective tissue is surrounded by an inflammatory zone of greater or lesser extent. That is, there are present inflammatory corpuscles partly shrinking into cheese, in part still nourished by the same dilated vessels which give rise to the reddened mucous membrane and the moist râles. A successful man is he who will have succeeded in silencing the moist râles and getting rid of the inflammatory surroundings in part by checking the continuation of the development of these elements and in part by aiding their absorption.

The success lies *in controlling the chronic inflammatory process long enough to permit the safe contraction of newly formed connective tissue within the smallest attainable limits.*

To promote absorption, we have recourse to increased vascularity as pointed out in the treatment of the general condition, or by counter irritation, or both.

I am quite awake to the dangers resulting from such measures, in cases where the process is anything like acute. This, however, is to be conscientiously and frequently ascertained by the temperature, pulse, subjective symptoms and careful auscultation.

The suspicion of acuteness justifies us in rather resorting to treatment by warmth and moisture than to counter irritation and absorption.

I am not a special defender of poultices as against ice; the accidents resulting from active determination of blood to the lungs, as in œdema and hemorrhage, belong to the distressing symptoms, and call for ice.

The presence of activity in the lung tissue, I repeat, in addition to general, calls for the following local treatment:

First—The unsparing application of warm poultices. Flaxseed is the best, but slippery elm, or a warm water jacket may be substituted. Whatever application is used, it should be applied moist (no dry warmth), covered by oiled silk and changed every hour and a half. This system of applying poultices, favorably mentioned by Niemeyer, would appear rather antiquated, but in acute lung processes, however localized, they are as beneficial as in more extensive pneumonia.

When activity of process cannot be established, as existing, dry cupping over the infiltrated portion should be resorted to as frequently as the skin will permit of it. Wet cupping is not to be thought of.

Counter irritation properly speaking, to wit: The creating of a local irritation and inflammation over the affected part, tends to promote absorption by checking inflammatory action in the original seat of disease long enough to permit of changes for the better to occur therein.

For this purpose we may use blisters, croton oil and the seton. If a blister is to be used, two points must be looked after: The irritation must never be so great as to cause

fever; and the blisters must be applied in as rapid succession as possible.

The same holds true in regard to the application of croton oil. It has the advantage over blisters of causing less pain, by a uniform eruption, which does not entirely disappear for a week. A good formula for this application is: Æther. sulph. ℥ii., Ol. crotonis ℥ii., Tinct. iodinii ℥v.

In localized pleurisies, which at times occur in various places at once, I have found this application useful in promoting absorption. Where no longer any pain is caused by deep inspirations, tincture of iodine or Lugol's solution is to be applied twice a day by painting over the same surface twice each time.

A prolonged and steady derivation of the chronic process to some other part, has been mentioned by authors at various periods as likely to have a future. Its value has never been determined by systematic trial, so far as I am able to gather from literature.

A seton in the arm (over the deltoid is spoken of in Ziemssen. As part of local treatment we may in future find it useful.

* "Can this (a fresh invasion) be prevented by establishing an issue on the upper part of the arm, as was customary in former times? How much benefit is to be derived from the use of revulsive measures for the purpose of changing the abnormal course of the nutritive processes, it is impossible to say; nor are we able at the present day to explain how an artificial suppuration can check internal disorganization, or diminish established morbid discharges, especially suppura-

* Ruekle—Pulmonary Consumption—Ziemssen's Cyclopædia.

tions in internal organs, and yet in all times there has been unbiased testimony to show that this mode of treatment apparently modifies the course of morbid processes and particularly those which are of constitutional character or are dependent upon a dyscrasia."

But a seton must neither be in dangerous proximity to the seat of disease itself, as in the thorax, nor in too remote a part of the body.

The upper arm would seem to be the suitable place. Again, the extent and character of the inflammation thereby induced will have to be carefully watched, especially the too rapid formation of pus, as well as the possibility of septicæmia.

One of the sovereign adjuvants for causing determination to the skin, as well as for general effect, is the local douche. It may appear contrary to reason at first that cold douche should stand in the same category with warm applications; yea, even applicable to the same cases. Any one who has at all studied hydro-therapy will know that the effect aimed at is the same by a different method. In one case we invite a flow of blood to surrounding parts to promote absorption; in the other we bring on a sudden contractility of vessels, soon followed by dilatation and refilling of the same. A local douche cannot of course be confined to any particular part, though it may be made to act more decidedly upon it. We achieve by the douche, therefore, two important things: *A strong impulse to the activity of the skin, and a general effect upon the whole system.* The first stimulates the respiratory function of the skin. The second does much to weaken the strong disposition of the patients to colds and to slight relapses.

The subject of douching might have as appropriately been spoken of as part of the general treatment, but its application is primarily local, and besides, different conditions call for different applications of the douche in form and strength.

The literature upon the use and abuse of the douche in its various forms is very extensive, as regard its use in general diseases. In its application to phthisis, its uses have been tested and reasonably well defined at the resorts for consumptives at Gœrbersdorf, Falkenstein and Inselbad, near Paderborn.

Before stating the indications for the use of the douche, I feel it imperative upon me to say that nowhere is strict individualization more called for than here, according as an individual may be only a trifle or very far removed from the health line. According to the experiences of Drs. Brehmer and Sokolousky at Gœrsbersdorf, and Dettweiler at Falkenstein, the following rule may be laid down in regard to the use of the douche in pulmonary consumption :

About thirty-five per cent. of patients are able to bear the douche with benefit to themselves.

There are two forms of the douche, the rain (sieve) douche, and the solid stream, which latter may be applied from above as well as from the side—vertically and horizontally.

Of application to the general surface for the purposes of cleanliness and for promoting capillary action, we have spoken in connection with the treatment of the general condition. Experience has shown that if a person is found fit to be douched, according to certain indications as laid down

in the previous chapter, it is better to precede any local application of the stream by a rain-douche to the general surface. This will tend to uniformly increase contractility of capillaries over the whole surface, after which the local application can be made without risk.

The length of time of each shower should not exceed five seconds. This may be done daily for from four to five weeks before local douching is resorted to.

For infiltrations situated in the apex of the lung, the vertical stream is to be applied ; for infiltrations in the lower lobes and pleuritic adhesions with or without effusion, the horizontal one is applicable. In either case let the time be about five seconds in the commencement, and if reaction sets in successfully, for three or four days in succession, the time may be increased by five seconds daily. Thirty seconds (half a minute) is, however, to be the maximum of time.

A quick and thorough rubbing down should immediately follow the application of a shower. This is best done by throwing a dry sheet over the patient, drying him off and then rubbing him down with soft crash towels. Wherever it is at all feasible, a brisk walk should follow immediately upon the douche.

The application of the douche should not be entered upon unless all surrounding conditions are favorable ; and once begun, all details should be rigidly enforced. Under no circumstances should the carrying out of the douche programme be left to the patient and his friends. They must be attended to by the physician himself or else abandoned.

I am quite aware that in a large number of cases in private practice this is not feasible. In such cases we may with

great benefit resort to wet sponging or dry friction in the patient's own room, and executed by the patient himself.

Consumptives applying for treatment have often gotten out of the habits of cleanliness. From fear of catching cold they have become strangers to the use of water. Hence their vulnerability is manifested in the irritability of the skin, which must be weaned back to the normal condition. It is best, more especially in winter time, to direct dry friction of the thorax, both in front and behind, by means of a crash towel, for about ten days. After that, cold sponging, followed by the same friction, will be of great benefit. This sponging should be done immediately upon rising in the morning—the best time to relieve the stagnatory congestion of mucous membranes by derivation to the surface. The room to be at a temperature of seventy degrees to seventy-five degrees. Salt (and if possible sea salt) should be dissolved in the water the night previous, ready for immediate use. I always direct the neck and the thorax, both front and back, to be rapidly slapped with the wet towel (not a sponge) and then leisurely dried with gentle friction.

Your attention is lastly directed to two forms of local treatment of cavities and infiltrations which may be looked upon as direct assaults upon the offending portion of the lung itself. I refer to direct injections into the parenchyma itself by means of a needle passed through the thoracic walls into the lung; and secondly to the inhaling of substances via the larynx and bronchial tubes.

The idea of so bringing the diseased lung within reach, as to be able to treat it as any other ulcerating surface, is not a new one. Not only is aspiration or free incision the ac-

cepted treatment in cases of empyema, but cavities in the lung substance have been laid open and treated as open wounds.

All of the following history, indications and results I gather from the pamphlet by Prof. Wm. Pepper, of the University of Pa. *Further contribution to the local treatment of pulmonary cavities. Extracted from the transactions of the American Medical Association.*

The idea of opening lung cavities by incision through the chest walls, is as old as Bagliori, (possibly older.) In the present century it was performed by Hastings and Storks. But it is only within the last few years that continued treatment of cavities by local application has been seriously entertained and carried out.

Operations by Storks and Mosler have shown that lung cavities are quite tolerant of external interference; that they may be cut down upon and opened, canulæ, introduced and retained and medicinal agents injected in solution or by spray.

Dr. Wm. Pepper was the first to practice (Feb. 1874.) continous injections into cavities and infiltrations by means of delicate canulæ and to demonstrate that they may be conducted without severe pain, hemorrhage, traumatic irritation, or interference with internal medication and hygienic measures.

The dangers which present themselves in this proceeding are as follows ;

First—The imperfect length and strength of the needle, of course an ordinary hypodermic needle will not penetrate into the substance of the lung, not even into a very superficial cavity, careful measurements upon the cadaver have proven to me that the proper length of the needle should be

one and a half inches. To make assurance doubly sure, it is well to have an additional one of two inches in length for deep seated infiltrations and cavities.

The needle must be a little thicker than the ordinary hypodermic, with a very decided bore and well sharpened at the point and on the flat.

Second —The resistance of the pleura. This is far greater than imagined by any one who has never tried it. It feels as if you had struck a firm wall. But a decided push will readily overcome this obstacle and the quicker it is done, the better for the patient.

Third—Uncertainty as to whether you will properly strike an infiltration, or enter a cavity. Here you can safely be guided by the results of percussion and auscultation on the one hand and by the sensation conveyed to your hand after passing the pleura.

Fourth—Sudden and greatly increased action of the heart and in consequence, the expectoration of small quantities of blood. We know that the first effect of the introduction of any foreign substance into the blood vessels or into organs is violent action of the heart. This is temporary and passes over.

Fifth—The setting up of a fresh inflammatory process and with it the increased dangers of increased infiltration and more rapid destruction. It is true that we have no exact means of ascertaining what amount of surgical or medical interference will produce just inflammation enough for adhesive purposes and just when the scales will dip in the direction of renewed ulceration and sloughing. These risks and the old maxim, that it is preferable to let well enough alone, have

given a check to this sort of local treatment. Now I hold that knowing full well the dangers to be expected, we are called upon to forestall the same and not to wait until an active inflammatory process is developed.

To this end I have used ice bags over the affected part, a few hours after the injection and continued *at intervals* for three or four days.

The degree of cold is of course to be regulated by the sensations of the patient; the ice may be in a bladder or in a rubber bag. Again the patient may stand the cold for several hours and a release given him from time to time. Quinine in small doses should also be administered for two days.

The above analysis of dangers and their prevention is the result of my own limited experience. Dr. Pepper does not attach so much importance to the same, for reasons which will appear shortly.

Before making an injection, the skin at the point of puncture should be chilled by ice or ether spray to deaden the sensibility.

The liquids thus far used by Dr. Pepper have been dilute solutions of carbolic acid and iodine. The former, where the destruction of fetor from expectorations was aimed at; the latter in attempting arrest and cicatrization.

The strength of the solutions used are: Carbolic Acid, two per cent. (10 drops — ℥i); Iodine, Lugol's solution (liquor iodin. comp.) in proportions of one part to from three to twenty parts of water. At present I am engaged in making trials with the chlorides-aluminum, magnesium, potassium, &c.

The amount of liquid injected must be determined by

the tolerance of each individual, the first injection being from five to ten minims and subsequent ones from twenty to thirty.

This accounts for the absence of danger from a too active inflammatory process in Dr. Pepper's cases.

The depth into which the needle is to be introduced, depends of course upon the thickness of the thoracic walls and the superficial or deep position of the cavity or infiltration. This varies from three-fourths of an inch to two inches.

Now when it is shown that these injections are practically free from danger, we turn our attention to the indications which present themselves for their use, and to finding out to what extent these indications are met.

The objects desired to be accomplished are :

First—Disinfection of the contents of a cavity.

Second—Diminution of formation of pus.

Third—Relief of cough.

Fourth—The favoring of cicatrization and contraction and the prevention of general infection (septicæmia).

The results obtained have been as follows: Sputa of an offensive character are readily freed from fetor by injection of carbolic acid, which was found to exert a prompt influence.

The amount of expectoration is notably and rapidly diminished.

Cough is very considerably relieved. The paroxysm of cough, excited by the entrance of the liquid into a cavity, is of short duration.

Autopsies proved a highly favorable appearance of the living membrane of the cavity, indicative of an arrest of ulceration and a marked tendency to reparative action. In a certain number of cases, not only arrest of progressive disease,

but development of connective tissue, so as to circumscribe the cavity and tend towards its contraction.

Finally let me tell you in what class of cases injections are most likely to be of service, according to Dr. Pepper's investigations thus far :—Cases of single, superfical and circumscribed cavity with comparatively little surrounding disease, and without implication of the other lung, are best adapted for local treatment by injections.

Cases of cavity, with extensive disease of the surrounding lung or of the other lung, hold out no prospect of permanent benefit from local treatment; but nevertheless, much relief may be afforded to certain symptoms, as frequent paroxysmal cough connected with efforts to empty the cavity, or fetid expectoration.

In cases of extensive consolidation of lung tissue, there is no good to be expected from injections into the diseased area.

In cases where there is circumscribed partial consolidation as in the first stage of catarrhal phthisis; which persists obstinately and tends to spread despite the use of other measures (hygienic care, change of climate, internal medication, etc.), or, where the most important of these favorable influences cannot be secured, injections of medicated liquids into the diseased tissue may be tried with propriety.

The subject of *inhalation* has ever been one of more or less absorbing interest to the profession, as well as to the laity.

Inhalation of remedies for diseases of the inhaling apparatus appears very plausible to the public, and hence quackery has disported itself in connection therewith and assisted in bringing this method of treatment into disrepute with the regular profession, and in great part justly so.

Before entering upon the trial of a remedy by any route, we are to determine first, whether the remedy is applicable to the condition existing within the diseased organ, and secondly, whether or not the aforesaid remedy will reach the seat of disease by the route proposed. Now what are the facts in regard to the possibility of remedies reaching the lesser bronchi, bronchioli and air-vesicles of the lung.

Atomized substances, &c., reach the bronchioli and air-cells. This was demonstrated in the experiments of Dr. Tappeiner, of Merau, of Schottelius, of Clark, Fox and Sanderson, to settle the question of inoculability of tubercle. With this latter question we are not now concerned. For our purposes it suffices to know that atomized substances, fluid and solid, such as tuberculous expectoration, mixed with water, and powdered cinnaber, reaches the air-cells. It is further to our purpose to know that as regards the conditions under which such inhalations were made by dogs, they were those of continued inhalation in a closed chamber and of very powerful and forced inspiration.

It is clear therefore, that the success of inhalation in general depends upon the force of the propelling power, the profundity of the inspirations and above all upon continued inhalation. We know that gases pass through by interchange. In the case of atomized fluids and solids, (vapors and fine powders) it is somewhat different. They are not as diffusible as gases; there is no interchange between inspiration and expiration; on the contrary, the expiratory force is rather a hindrance to their admission. Then again they have to pass the narrow entrance of the larynx, the numerous bifurcations of the bronchial tubes from the tracbea down, and at each turn meet

with some resistance, which does not increase their chance of reaching the final destination.

In view of all facts bearing upon the case, are any advantages to be derived from the inhalation of medicinal substances? Part of this question has been answered in speaking of inhaling compressed and rarefied air. It has been shown that its effects are those of *pulmonary gymnastics in conjunction with the full and well fixed attention of the patient.*

The same holds true of inhaling atomic substances, with the additional factor of the patients certain faith in remedial power of a remedy thus directly administered. Deception is not to be countenanced in the Practice of Medicine. Still the mental condition of a patient is a factor, with which we are bound to deal. Buoyancy of spirits and a firm belief in his ability to get well, are aids not to be despised. A part of the atomized substance no doubt reaches the surface of a cavity; into the neighboring inflammatory fields or into an infiltration it cannot enter. A direct influence upon the healing process cannot be claimed for any substance introduced by inhalation, because it would require almost incessant inhalation to accomplish what in the end would yield but small results; on the other hand, pulmonary gymnastics must be kept well within bounds and never exaggerated.

Is the ordinary inhalation of remedial substances, then, useful only as pulmonary gymnastics? No, not altogether so. In the coarser tubes we find some use for their local action. In bronchiectatic dilatations the bronchial walls are rigid and hence have lost much of their propulsive power. Pus that has accumulated becomes inspissated and mucus becomes tough; both from water abstraction. The same may take

place in the bronchial tubes and in the folds and pockets of the larynx, causing continued irritation.

Now the two points which we are able to cover, are to *re-supply the inspissated material with moisture to render it more easy of expectoration ; and to relieve and partly subdue irritation.*

The inhalation of steam, pure or impregnated, may, as we have seen, prove too much of an effort for the respiratory muscles. In addition to this it has a tendency to increase irritation, in the beginning at least, This is a drawback which renders deep inspirations in the inhaling of the medicated substances almost futile.

As an aid in rendering tough expectorations more soluble, the inhalation of common salt is as good as anything I know. The object being to supply the tough mass with moisture and possibly slight disinfection, no one particular remedy is more beneficial than others.

Appetite and digestion of the patient are too precious, to be placed in jeopardy by filling the buccal cavity with a bad tasting substance.

Twice a day is sufficient for such inhalations.

This seems to me the proper place to speak once more of the inhalation of the benzoate of soda as practiced only a short time ago by several authorities abroad. With them, it must be understood, inhalation served to combine absorption into the general circulation with local effect upon the diseased portion of the lung.

Or again, inhalation would be combined with internal administration, a line of treatment which is rational and in accordance with the plan advocated by me of changing the remedy or form of the remedy, and likewise alternate as to the

route of introduction, or to combine two routes at once.

Always however keeping the management of the general condition and of the digestive function in the foreground.

The following doses and modes of administration were some months since published in the "*Medical Record*," Letzerich recommends for internal administration the benzoatc of sodium :

℞

Sodae benzoat. ℈iv.
Aquae destill.
Aquae menth. pip. aa. ℥i ss.
Syr. cort. aurant. ℥ii ss.

M. S. Tablespoonful every hour, for adults.

Klebs advises the inhalation of ℥ii ss. per day at two or three sittings, conjointly with the benzoate of magnesia internally, in doses varying from ℥i to ℥ii per day.

Schueller uses ℥i to ℥ii benz. soda per day, taken by thc mouth in doses of ℥ss to ℥i.

Kroczak employs inhalations of a 5 per cent aqueous solution.

Others have used and recommended a 2 per cent. watcry solution, the sittings lasting at times over an hour.

The dose administered by inhalation is ℥ss at starting, with a gradual increase up to and above ℥i ss daily.

Two to three inhalations are practiced each day, the sittings in some instances lasting two hours (counting pauses for rest).

The minimum dose appears to be about 10 grains ; the maximum ℥ss and even ℥i.

Lastly a word or two concerning apparatuses for inhalation and insufflation.

Apparatuses for the introduction of atomized substances are of various kinds ;

Steam atomizers of various shapes and patterns.

Atomizer by compressed air with self acting cut-off.

Hand apparatuses with one and two rubber bulbs.

For insufflation; Warner's insufflator: a curved hard rubber bulb for thumb compression.

The remedies used to allay irritation by inhalation will be spoken of together with other forms of administration in connection with the treatment of cough as a symptom.

One form of inhalation has lately been re-introduced which appears to promise more favorable results than heretofore attained. I have reference to direct *local medication of the lung by continuous inhalation of an antiseptic atmosphere, brought down to a practical shape.*

Before giving the details and results as furnished by Dr. Pepper, let me say that while my objections to long continued or continuous breathing of any substance or form of air are based upon tiring out the respiratory muscles and the heart, this method enables the patient to breathe continually at his ordinary rate. This because the apparatus is attached to the mouth of the patient, worn day and night, thus enabling him to "respire an atmosphere charged quite strongly with alterative or disinfectant vapors". *

"Two or three years ago, Dr. W. Roberts, of Manchester, England, described a simple portable "respirator inhaler," in the form of a metal box, perforated in front and behind, and filled loosely with layers of tow on which the inhalation liquid was poured. This inhaler fits over the mouth and is

* Pepper—Local treatment of Pul. Cavities, pp, 4 to 6.

fixed over the ears like an ordinary respirator. A much more convienient form of apparatus for continous inhalation has been devised and extensively employed by Dr. H. Curschmann, now of Hamburg. He has used it with great success in cases of putrid expectoration due to chronic bronchitis, and also where there has been destructive disease of the lung accompanied with offensive sputa. In at least one of his two most remarkable cases I think, however, the physical signs are open to an interpretation different from that which he assigns, and one which renders the recovery of the patient less extraordinary.

I quote the following report of one of these cases: A man aged 53 who had been ill some months with symptoms of phthisis, was admitted under Dr. Curschmann's care in Nov. 1878, with dullness, bronchial breathing, and medium sized moist râles over the lower half of the right lung posteriorly. At one point percussion was tympanitic, and auscultation revealed signs of a cavity which was proved to be such by tapping and drawing off some of its fetid contents. The patient expectorated about a litre of most intolerably putrid secretion in twenty-four hours. His evening temperature was 39° C., his pulse 112, and he suffered from night sweats. He was treated throughout with almost continuous inhalations, first of oil of turpentine, and then of pure carbolic acid. In three weeks, the sputa were quite free from smell, fever and night-sweats had left him, and he only spat up about one-third of the amount he had done on admission. As in the other case referred to above, there was ultimately extraordinary disappearance of the abnormal physical signs, and the patient gained twenty pounds in weight during his scarcely six

months stay in the hospital. Except a little morphine for the cough at the first, he took no medicine internally, no hypophosphites, no iron, no cod liver oil. In both cases the successful result can be attributed to nothing except to antiseptic treatment—for such it is—by inhalation.

Since obtaining a supply of Curschmann's respirators from Berlin.

* I have used continuous inhalation in a certain number of cases. There can be no doubt of its efficacy in destroying the putrid odor of the sputa in some cases of dilated bronchi or pulmonary cavity. It certainly exerts a modifying effect on the bronchial mucous membrane, and may be of material service in the treatment of obstinate bronchitis. I have seen unmistakable benefit from its use in cases of empyema discharging putrid pus through a pulmonary fistula. In cases of extensively diffused chronic catarrhal pneumonia, I have some interesting evidence pointing to the benefit that may possibly be derived from the continuous inhalation of suitable vapors. In cases of true pulmonary cavities, however, apart from the disinfection of their contents, it seems to be unsettled how far the condition of the walls can be modified even by this method of inhalation.

It appears to be a subject deserving of thorough and prolonged investigation, and I am now engaged in carrying out observations on a number of suitable cases. The mode of using these respirators is very simple. The space between the wire disks, through which the air is respired, is filled with fragments of sponge on which the substances used for inhal-

* This respirator is figured in the Berliner Klinische Wochenschr, No. 27, 1879, fig 430; and can be obtained from H. Dunzelt, 22 Schaaren-Straase, Berlin.

ation are poured. Those which have so far yielded the most satisfactory results are carbolic acid, creosote, oil of turpentine, a mixture of tincture of iodine and compound tincture of benzoin, and thymol. If care be taken to apply a little cosmoline to the skin where the rim of the inhaler touches the face, and to wipe the rim frequently, no local soreness will be produced The vapors of these substances, even when dropped on the sponge undiluted, are tolerated with remarkable ease. Some patients become impatient of the constraint of wearing such a mask continuously, but as a rule, a clear explanation of the object in view, and the permission to leave off the respirator for a few hours each day, will overcome all such difficulties."

Symptomatic treatment includes the management of all urgent and distressing symptoms which may arise during the course and at any stage of pulmonary consumption, regardless of the general or local treatment for the time being. Of such occurrences are cough, night-sweats, hemorrhage, diarrhœa and sudden collapse from failure of the heart's action.

In the foregoing pages, mention has been made of the causes of cough; presence of tough masses, ready for expectoration, with partial loss of propulsive power of the bronchi and peripheral irritation of the superior laryngeal nerve; which irritation may be caused by the presence of tubercle; or an ulcerative process in any part of the respiratory tract. The presence of tough muco-purulent matter is of course as much a cause of irritation as the others, but is mentioned separately, because with it we are enabled to remove and continue to

remove the cause; whereas in the other cases we merely allay irritation without removing the cause.

Percussion and auscultation will enable us at all times to determine which cause is present and whether removal is called for, before an effort is made to allay spasmodic irritation; or whether irritation is to be soothed at once. It will by no means do to use expectorants and the like indiscriminately. A great deal of harm may be done by the continued retention of secretions ready for expectoration. It would be equally injudicious to prescribe a stimulating expectorant, when the most careful soothing and suppression of irritation is called for.

Let me add that expectorants should be very sparingly, given and only under pressing indications. This applies especially to all expectorants of which opium or its alkaloid are the bases.

Stimulating Expectorants, carbonate of ammonia; muriate of ammonia; tinctura sanguinariæ; liquor ammoniæ anisatus or benzoicus; benzoic acid.

The following are convenient formulæ used by me:

℞

Liquor ammon. anisat. gtt. v–xv.
Morph. sulph. gr. 1-8
As a dose three or four times a day.

℞

Acid. benzoic. gr. v.
Sulph. aurat. gr. i.
As a dose every three hours.

Soothing expectorants—To allay an unnecessarily irritative cough, we have recourse to internal administration, in-

halation, insufflation or application to the larynx by a hair-brush. Do not use a sponge-probang.

In internal administration, morphine of course takes the front rank for effect. For many reasons it is best to avoid giving it, except in the last stage or at great intervals in other stages, and to use the other anodynes first. Of these, I know none better and more reliable than *Chlorodyne* - This is a happy combination of chloroform, morphine and oil of peppermint, minus the bad after effects of opium. From ten to fifteen drops may be given at bedtime, and at long intervals as required.

Oxalate of cerium is excellent, and is followed by no bad effects whatever. Merck's preparation has been found to be far superior to others. Five to ten grains put as a dry powder upon the tougue at night will allay irritation beautifully. Or it may be given in the same manner three or four times a day. Sulphuric ether; extract of hyoscyamus and dilute hydrocyanic acid will likewise allay irritation.

The following are a few of my favorite formulæ :

℞

Morph. acet. gr. ii.
Acid. hydrocyan. dil. ℥ss.
Tinct. sanguinar. ℥ii.
Syr. pruni virg.
Syr. tolutani ad ℨii.

M. S.—Teaspoonful every 2 or 3 hours.

℞ ———

Extr. hyoscyami sicc. ℥ss.
Aquae amygd. amar. ℨi.
(With morphine if required).

M. S.—Twenty drops four times a day.

℞

Aether. sulph. ℥iii.
Tinte. hyoscyami.
Syr. pruni virg.
Syr. tolutani aa ℥i.
Aquae *ad* ℥iv.

Dose:—From one to three teaspoonfuls.

By hypodermic injection to insure rest from irritating cough at night: Morph. sulph. gr. 1-12—1-8 with 1-120th grain of atropine; Pilocarpine, gr. 1-3. Application to larynx by hair-brush: Solution of nitrate of silver (℥i—℥i); may be used every fourth or fifth day, in order to destroy excessive peripheral sensibility. Though rather a rough proceeding, it proves of benefit frequently when other measures have failed.

The following formulæ are useful for topical application :

Acid. tannic. gr. x in ℥ii. of Glycerine, also :

Iodinii gr. vi.
Potass. iod. gr. xii.
Glycerini puri ℥ii.

M. S.—Local application (in chronic pharyngitis).

Inhalation is useful by combining the allaying of irritation with deodorizing the expectoration. The best remedies for accomplishing these objects are : Oil of turpentine, the bromides of potassium and sodium, salicylic acid, creosote, compound tincture of benzoin.

A few drops or ol. terebinth, creosote, or chloroform or all three may be inhaled for convulsive cough with offensive sputa.

℞

Ol. terebinth. gtt. xv–xx.
Exte. opii aquosi gr. i.
Aquae ℥i.

M.

A slight peripheral shock, in the shape of little ice pills at night prove grateful. In the absence of other remedies, a teaspoonful of honey allowed to dissolve on the tongue, has stood me in good stead in allaying peripheral irritation.

When *hemorrhage* from the lungs occurs, you will find accompanying it a rapid heart's action. Indication, therefore: to control the hemorrhage and also the heart's action. The chief of all remedies for this mishap is the fluid extract of ergot. Twenty drops should be administered hypodermically and into the skin covering the chest, as nearly in loco as possible. Ice should be applied without fear or hesitation. To control the heart's action (in part accomplished by ergot) digitalis in tincture, ten to fifteen drops, or infusion (doses of ℥ss—℥vi.) The tincture of night-blooming cereus (tinct. cerei Bonplaudii) in five to ten drop doses is said to act well; my experience with it is too limited to warrant an expression of opinion as yet.

In several urgent cases, where œdema threatened and the heart's action was very rapid, I unhesitatingly made a bold hypodermic injection of half a grain of morphine (and once three-fourths of a grain) and carried my point in each case. That this was taking a liberal risk, I am quite aware, but boldness is occasionally requisite.

Gallic acid and common salt are old remedies, successfully used before ergot came into vogue.

Night-sweats are a troublesome and weakening symptom.

In connection with a rational treatment, a little cold cognac at night in the shape of a milk-punch often does excellent service. Two or three tablespoons of first rate brandy or bourbon whiskey mostly answers.

Next to this simple remedy stands the hypodermic injection of atropine—gr. 1-80—at bedtime.

Sponging with cool water and alcohol is practiced in certain sanitaria in Europe.

A good formula is ;

℞

Zinci oxid. gr. xii.

Extr. hyoscyami gr. xviii.

M. f. pilul. No. vi—S. One at bedtime.

The mineral acids : dilute sulphuric, aromatic sulphuric and dilute muriatic acid are ancient remedies.

Diarrhœa is often a troublesome symptom in the last stages. A regular gradation of remedies may be used, all of which act beneficially. Rapid change from one to the other is often admissible. The most reliable astringents are : catechu, tannic acid, opium, calumba, kino, argent. nitr., and enemata of starch with astringents and opium.

Claret wine is a good adjuvant, so is an imported cheap Greek wine, called "Camarite."

What your duty to diagnose is, whether you are dealing with a catarrhal condition or an ulcerating surface and act accordingly. Dr. C. T. Williams has recently written in the "*Lancet*" upon this subject. He adds to the above conditions, waxy degeneration of the bowels. In the catarrhal form he recommends altering the dietary and order-

ing a few doses of alterative and purgative medicine, with some alkali to reduce the acidity.

In the ulcerative form, he recommends three sets of measures: a, rest in bed, with easily assimilable food, such as chicken broth, beef and veal tea, milk gruel, blanc-mange, always combined with liquid pancreatives. Koumiss is also highly recommended.

b, Warm applications to the abdomen in the shape of linseed poultices, turpentine stupes, or hot water fomentations, to reduce the pain and produce derivation to the skin. In severe pain, small blisters.

c, Internally astringents. The most powerful of mineral astringents is sulphate of copper in one-quarter or one-half grain doses. Of vegetable acids, tannic acid is the best, in four grain doses. Enemata of lead and opium may have to be resorted to. Astringent enemata are best combined with a pint or a pint and a half of linseed-tea.

Dyspnœa may arise from such temporary causes as the presence of gases in the stomach and bowels, slight disturbance of the innervation of the heart and from a variety of causes during the course of a healing process. Of course the cause is to be removed. The sudden occurence of flatulancy, apart from a generally weakened condition of the digestive organs, is a very troublesome symptom, mostly caused by fermentative processes in the alimentary canal. For patients in whom such temporary accidents are of more or less frequent occurence, it is best to have on hand some pulverized charcoal for immediate use, as for instance the following mixture:

℞

Carbon. animal. ℥i ss.
Magnes. hydr. ℥vi.
Aquae ad ℥vi.
M.S. Tablespoonful as required.

From one-half to one ounce of tinct. cinchon. comp. with a little syrup of orange peel answers the same purpose.

For immediate relief of threatening dyspnœa, a hypodermic injection of morphine is the thing.

Of late the fluid extract of Quebracho has attracted considerable attention. It is the fluid extract of the cortex of quebracho blanco and is administered in doses of from one-half to one drachm. By increasing depths of inspirations, it relieves dyspnœa and thereby facilitates oxygenation of the blood. One of the drawbacks to the use of quebracho is that, like many other fluid extracts, it is very unreliable.

CLIMATIC TREATMENT.

The question of a proper climate for consumptives is very important, and yet not one which received careful and proper attention in former times.

Patients have been sent to "mild climates" since time immemorial, for reasons which no authority has ever been able to establish. Statistics did not improve under this system of expatriation. It is only within more recent times, that constant attention is being paid to this subject and not without some encouraging results. Our knowledge of meteorology is now so far progressed, that thermometrical, barometrical and hygrometrical observations are daily made in most of the civilized countries.

True, no ideal climate for all classes of cases has been or ever will be found. Dr. Loomis is right when he says, that in regard to climate, no absolute rules can be laid down. And again "The individual pecularities of each case must decide this question. Experience shows that one individual improves in a warm, moist air : another individual improves in a cold, dry air. Every phthisical patient has a climate adapted to his peculiar diathesis." How to find this out, will be spoken of later on. It will also be my endeavor to demonstrate, that we have so far advanced in our knowledge of the relative value of various climates, as to be able

to present certain advanced foot-holds, which will serve as a guide to your judgment.

Medicine is not an exact science, that branch of it called therapeutics least of all, and the further we are removed from exact and fixed rules, the more will you be called upon to exercise your judgment in individualizing and in strict attention to detail in conformity with the plan which may be marked out for climatic treatment.

Before proceeding to a detailed account of the comparative benefits derived from sea and mountain air, a few words may not be out of place, in regard to pure fresh air in general as a remedial measure.

And first let me say, that no air of whatsoever part of our globe, be it on land or water, at the top or at the foot of mountains, in proximity to or in the middle of the ocean, *has any specific qualities which tend to cure consumption.* This fact cannot be recalled to mind too often.

Our pabulum vitæ, the air, cannot and does not act directly upon solidified lung tissue, whether this air be diluted or compressed, warm or cold, pure or impure.

The same holds true of inhalation of air, that obtains in reference to artificial inhalations. The gates are more or less tightly closed against it by swelled mucous membranes and secretions from the terminal bronchi, by desquamated, partly metamorphosed epithelium filling in the terminal bronchi and alveoli.

The enjoyment of a pure, fresh air is a capital remedy, but it needs to be regulated and fitted to each individual case by close supervision, or it may prove as harmful as other remedies wrongly administered.

Therefore the atmospheric air should be handled therapeutically like other remedies. For pure air is not stationary and continuous, but requires the occasional interference of severe meteoric changes, and this factor may in a measure be considered a disadvantage.

This much is promised, in order to point a moral in connection with indiscriminate living in the open air in the way of camping, residing on a farm or "ranching" as it is called in Colorado and in other Western States. Such primitive styles of living for one not accustomed to them (I refer especially now to inhabitants of cities and towns) are not productive of any good, for two reasons : First ; because it is undertaken under the mistaken apprehension that this fresh air is " nourishment for the lungs."

Second—Because those who camp or ranch do so, under the impression or instruction that their whole mode of life should be revolutionized, turned up side down as it were.

The reason why open air is beneficial at all, is chiefly because the patient is at all times completely *surrounded* by it, But this does not constitute nourishment to the lungs. You can scarcely find a book or pamphlet upon the subject of treatment of consumption, which does not speak of pure air as "nourishment to the lungs," which is misleading. The lungs are nourished by the bronchial arteries, whereas the pulmonary blood-vessels represent the whole body at large. It is through them that oxygen is carried back to the reservoir and from there distributed to nutrient arteries, one set of which are the nourishing vessels of the lungs : the bronchial arteries.

On a par with this notion of "nourishment to the lung"

is that which attributes the probability of "getting tired out" to the lungs, after severe exercise, such as climbing. The lung does no work in this connection, the muscles do that; it serves as a sort of gas-filter for the reception of oxygen and the casting off of effete products in the shape of carbonic acid. As regards the performance of function in the body, its role is really a passive one. This fact may account for its scarcity of nerve filaments.

The function of the lung is the effect of the labor of other organs. The fact of the pulmonary ramifications of blood-vessels being the representatives of the tissues and organs at large, gives us the clue to the benefits derived from the inhalation of pure air. This benefit, as was stated in previous chapters, lies in the strengthening of the propulsive power of the heart, which in turn encourages interchange of tissue and calls the assimilative powers into renewed action.

Healing of the local lung trouble comes in as a secondary matter, keeping pace with the general improvement, but not in miscellaneous air and not by unregulated living, as will be shown directly.

The second point, the desire of the patient to revolutionize his whole mode of life, too often ends like other revolutions—in complete collapse.

No step should be taken, no plan followed, without careful instruction from and more or less constant supervision by a strict physician. In the following pages, the exclusive method of treating patients in closed institutions will be lauded only so far as their advantages actually extend, but I do not consider them an absolute sine qua non.

But knowing well that the simplest gastric catarrh may

pave the way to destruction (to speak only of one danger), I hold that more or less constant supervision by a physician is absolutely necessary.

But the question will be asked: Is not this fresh air surrounding us at all times, as good as any other air? No, it is not. Absolutely pure air must have certain other qualities besides being plentiful.

Pure air requires primarily the absence of impurities in whatever shape, whether of atomized solids, fluids or of gases. That is, generally speaking, there should be an *absence of dust, of excess of moisture and of noxious vapors.* These conditions are only furnished by sea air and mountain air. In other words, both sea and mountain air rejoice in the absence of *vehicles for harboring and conveying noxious influences or animal or vegetable germs or hydro-sulphurous exhalations.* They alone can be truly called antiseptic atmospheres.

It is another error to suppose that the atmosphere of all sea coasts or islands must be surcharged with moisture.

To be of any benefit to the majority of cases of consumption, it requires, however, still further additional factors to constitute an approximately ideal breathing medium and these factors will be dwelt upon in their proper place.

Any belief, let me repeat, in the specific influences of any kind of air is unscientific.

That the belief in the efficacy of warm air has been so long-lived, is partly due to hum-drum methods and partly to the fact that a warm atmosphere permits of remaining out doors and enjoying plenty of it. But this unlimited enjoyment is, as I have shown, not sufficient.

I repeat that neither warm nor cold, moist nor dry air, nor air impregnated with any substance, be the same salt or pine tree exhalations, have either specific effect upon the lungs, nor any such contact whatsoever with the diseased portion, as would benefit the same in the least. Now let this be distinctly understood, that cures effected or benefits accrued in pine regions, in the middle of the ocean, or in the vicinity of the North Pole are not here called in question. But the factor to which such cure is ascribed, is not only called in question, but denounced as out of the question. Warmth, cold, dryness, moisture, artificial impregnations are all *influences of most varied kind, but of equal effect upon the molecular changes in our tissues.*

In this connection it may not be out of place to speak of the immunity of the inhabitants of certain countries or parts of countries from the scourge of phthisis. To me it has been a standing matter of surprise that this really existing immunity of the inhabitants of Iceland, the Faroe Islands, the Orenburg Steppes and other regions has not been properly accounted for before. The reasons thereof are very simple:

First—Phthisis is an ubiquitous disease, occurring or lacking entirely independent of climate. Statistical tables are the result of an accidental combination of circumstances, such as overcrowding commingling of races, &c., and bear no relation whatever to climate.

Second—All the tribes heretofore enumerated as exempt, are as far as possible removed from the centres of civilization, live simple and healthy lives, with plenty of out-door exercise and above all, notoriously abstain from commingling with other natives or tribes. Or what amounts to the same thing, nobody goes to Iceland, Spitzbergen or the Steppes.

Equally as false as the supposition of the existence of specific air for the cure of consumption, is the belief that climate has any hand in the development of pulmonary phthisis, in directly causing this dread disease. Here allow me to stamp it indelibly upon your mind, that *no particular kind of climate either in the torrid, temperate or frigid zone, and no particular country and part of a country in either hemisphere enjoys the privilege of originating consumption, because of its temperature or geographical location.*

The cases of consumption (which we have no time to enquire into in these letters) are found in connection with the mistakes and vices of civilization, such as overcrowding in cities, bad food and water, uncleanliness, alcoholic and venereal excesses and the miscegenation of races. It is a noteworthy fact that mulattoes form a large contingent of the scrofulous and consumptive army. But this is independent of their residing in New York, New Orleans, Zanzibar or Halifax.

Lastly, now be kind enough to distinguish between cause and the cure of the effect. Because there are no climates which especially cause consumption, that is no reason why there should not be localities where it is likely to get well. Mind, however, that this existing ideal atmosphere is not the outcome nor representative of the climate of any large section of country but of the *general geographical location and local conformation and advantages which include all or the great majority of factors necessary for a pure, fresh and antiseptic air.*

What these factors are, let me now tell you in the order of their importance :

In order to give you a clear insight into these ideal factors, I will divide them into "meteorological" (such as are connected with the atmosphere) surrounding our globe, and "terrestrial" (those springing directly from the earth itself).

METEOROLOGICAL FACTORS.

First—*Dryness or the absence of excessive humidity.* One of the best established facts in the climatotheraphy of consumption is that dryness is an almost absolute requisite. It has been statistically proven by Dr. C. T. Williams of England and stands corroborated. Desirable as absolute dryness is, it is not found anywhere and its presence would annihilate other important factors of the "ideal atmosphere," since that would preclude such meteoric phenomena as tend to change and purify the air. A certain amount of vapor is always present in the atmosphere. Its source is the surface of water, from whence it rises up into the air. Therefore the greatest amount of moisture is found over large bodies of water. Saturated air at a temperature of 60° contains 5.87 grs. of vapor in each cubic foot. Air expands with increasing warmth and its capacity for holding moisture is increased by expansion. Always keep in mind however, that because an atmosphere is expanded, as it is at high altitudes, that it does not follow that it contains so much more moisture. It is capable of carrying it, but that does not say that this moisture is present to fill that capability. It is popularly supposed that the presence of vapor in the air adds directly to the heat. This is a mistake. As water is turned into vapor, heat is carried off with it, but this heat remains latent

(sleeping), not capable of producing an additional effect upon the thermometer, or of exciting the sensation of warmth.

A moderately moist air is undoubtedly favorable in certain cases, when such moisture comes directly from the sea.

The injurious effects of moisture, which we wish to have consumptives avoid, consist of its preventing, by its presence in an over-dose, the taking up of moisture into the air from our bodies ; it hinders uniform water abstraction, the most important element of rapid tissue changes.

Of course the quantity of moisture present in the air in any locality depends upon the nearness of sources of moisture and the prevailing direction of the wind.

The degree of moisture which we would like to have as one of our factors, is one just sufficient to keep the land from becoming a desert, or, in other words, no moisture brought from large bodies of water near or far, and only a limited rain-fall throughout the year.

Second—*A certain equability of temperature.* The chief point to be desired in this connection is that the mean annual range shall not be too great. I have already told you that even persons of reduced resisting power are capable of meeting lesser changes of temperature. The tolerance of the lung against variously tempered air is much greater than is commonly supposed. Heidenhain has shown that it may amount to a difference of one-hundred degrees. That is, the normal lung can with impunity inhale air all the way from zero to 100 ° Centigr.

Not consumptives of course. If the annual range does not exceed 30° fahr. say that it ranges from 45° in the cold-

est season and 75° in the warmest; the mean to lie somewhere between 55° and 65°, we may call it equable.

According to J. H. Bennett, a temperature ranging from 45° Fahr. at night to 65° in the daytime, is physiologically the most conducive to the well-being and longevity of the human race.

Third—*Absence of strong and frequent winds.* We know that on the whole, winds which tend to keep the air in motion and change it, are beneficial. The desideratum is that these should be short-lived and not known to be of great velocity. Both uninterrupted blowing as well as great velocity exert a powerful influence in reducing the temperature of the body, by carrying off its warmth too rapidly. Besides, nothing proves so troublesome to the respiration of consumptive patients or so excites to coughing those who are afflicted with throat trouble, than strong winds.

Fourth—*Abundance of sunlight,* or in other words a decided preponderance of clear days in the year over the cloudy and rainy ones. In some sections of country the intensity of the unobstructed sunlight is very great. It mostly goes hand in hand with a preponderance of clear days.

Lombard tells us that light stimulates and darkness impedes respiration. Assuredly there are diseases, whose remote or immediate cause is insufficiency of light. Daylight stimulates the organism to greater nerve activity and greater capacity for reaction. I am satisfied, that light exercises a great chemical effect upon life; that the histo-chemical changes in our tissues, by which interchange is affected, combinations dissolved and colors created and changed, are due to the influence of sunlight.

Fifth—*Frequent changes in the electric conditions of the atmosphere.* As frequent changes are necessarily dependent upon and in connection with storms, it is desirable that these should be short, sharp and decisive, the same quality which we desire of the factor which is to keep in motion and change the air, namely, the wind.

I do not agree with certain enthusiasts, who pretend to be able to demonstrate a direct influence of atmospheric electricity upon the human body.

One of the products of active atmospheric electricity is *ozone* otherwise known as oxygen struck by lightning, electrified oxygen. Ozone is a powerful oxidizing disinfectant and as such probably serves to keep the air free from germs through its power of resolving all animal and vegetable putrescent matter into primitive and harmless forms.

TERRESTRIAL FACTORS.

Presence of a porous soil for the rapid absorption of rain or snow. Sandy or graveley soil will cause most rapid drainage by absorption.

Seventh—*Supply of water, pure in quality and plentiful in quantity.* Drinking water should be free from animal or vegetable germs, as it should be abundant for drinking and cleansing purposes.

Eighth—Presence of extensive *pine forests*, sufficient in extent to impregnate the air with terebinthine odors. If there is any value in the continuous inhalation of an antiseptic atmosphere, these odors should be able to cover that requirement: You will hereafter see, that as regards the absence of

germs, pine regions are serviceable in lieu of high altitude.

These then are the factors which are to be looked for in an "ideal climate." By carefully looking over and considering them you will observe, that all these together, or a majority of them, combine to create opportunities, favorable for a *pleasant out-door life, either of work or recreation*, or both harmoniously blended. Secondly; that insisting upon such elements as I have cited, we name the conditions by which alone a *pure unadulterated and antiseptic air may be obtained* for the phthisical patient. And next it becomes clear, that the presence of pure and unadulterated air is due to the combined influences of heat, light and electricity, wherever these three imponderable substances have full and uninterrupted sway. For it is by their combined actions that the atmosphere *is kept free from impurities.*

In addition to the above eight factors which we are desirous of finding in nature—nature's factors—it is of course desirable and often enough indispensable that the patient should be surrounded by conditions similar to those enjoyed at home. If expatriation must take place, let it at least not be isolation. We may therefore speak of desirable "artificial factors" in contradistinction to the above "nature's factors."

First—*Food* of proper quality and quantity. A patient cannot be expected to train his debilitated stomach to illy-cooked victuals, nor to change his American tastes for such as Spanish or Mexican. Many of the most desirable climates abound in indigenous vegetables and fruit; a great advantage over canned goods.

Second—*Society* is a factor, which not one patient in fifty could do without. Mingling and conversing with others of

the human family is an absolute necessity to keep the mind from becoming dwarfed. Nothing is so exhilerating as social amusements. Of course it is desirable that the patient should be among his countrymen or such as speak his native tongue.

Third—*Variegated scenery;* something for the eye to feast and the mind to dwell upon ; variety in the conformation of the country and an equable proportion of open country, timber land and surfaces of water, however limited.

Fourth—*Medical advice.* This is absolutely a sine qua non. It is not sufficient that the patient should see a conscientious and vigilant physician every now and then. He should be sufficiently near to such a one to insure prompt attention.

A reliable physician will know how to individualize and pay strict attention to detail in treatment.

At first glance it may seem to you, as if I had piled up an unnecessary number of requisites. But while I am free to acknowledge that all of Nature's and of artificial factors cannot be combined in any given case, you are to set your judgment to work to find, if not the ideal, the nearest approach to it. To aid you in this, let me give you a fixed maxim : *The highest percentage of cures will never be reached until climatic and home treatment are harmoniously blended. Personal supervision and treatment must be called in to aid climatic influences.*

Comparative freedom from impurities, I have told you, is found both in sea, and mountain air.

Both *sea* and mountain air are known to encourage and promote rapid changes of substance, although they differ

in the modus operandi. Both are subject to irregular variations of the barometer, as they are known to occur rapidly, and of short duration, both at the sea-side and in the mountains.

In contradistinction to wide plains, where slow changes of the barometer indicate equally slow and long-lasting rains, the sea-shore and the mountains have rapid changes, with rain of very short duration. These changes, once considered as productive of evil, are now known to be essential to the highest condition of health.

There is no doubt that *rapid changes of short duration are more favorable for the more important functions of the human body than relative stability.* We cannot endure either constant dryness or dampness, and since, therefore, barometric changes are necessary, such changes as take place rapidly and having supplied the absolutely necessary amount of moisture only, equally as rapidly return to the normal and usual standard, must be of benefit to invalids.

These conditions are shared by sea-shore and mountains, as above stated.

The difference in action between sea and mountain air, is now to be considered, of which Dr. Brown says, in substance :

Sea air acts rapidly, mountain air slowly; sea air very soon compels a more increased ingestion of food, stimulates digestion powerfully, so that the bodily weight is considerably increased in a short time. Mountain air, on the other hand, acts as a more subtle, slow stimulant, exerts its influence beneficially on enfeebled bodily functions, and their naturally increased irritability. Sea air pre-supposes robust assimila-

tive functions and equally robust integrity of the functions of the heart and lungs, however anæmic or otherwise enfeebled a person may be, if only their *circulation and nervous system are sufficiently above par to bear the strong stimulant.* Mountain air exercises a calming and indirect, quiet, gentle influence on the atonic and catarrhal condition of mucous membranes, and, however persons may suffer from weakness with increased irritability, it will act slowly but surely beneficially, if only the circulation and nervous system are still *capable of responding to the gentle and scarcely perceptible influence of mountain air.*

Of course you will understand that no rule or set of rules can be laid down by which you are to determine exactly what class of cases should go to the sea-shore and what others should go the mountains. A great deal must be left to individualizing and still more to the judgment of the physician, and this will to a certain extent ever remain so. Still experience has given us certain land-marks, which are positive and safe guides, while we have certain other less well established factors, which serve as out-posts, from whence you are justified in making raids by the scientific use of your imagination.

You will for instance have seen that sea-air will, so to speak, help those who can help themselves; those whose capacity of resistance has not yet fallen below the physiological line. But you will ask; where is this line? well, each individual has his own, so that we are often compelled to ascertain his capacity for reaction by actual trial; when a change may be found to become necessary. Thus a patient having tried sea-air may be compelled to go inland; but never vice versa.

There is a certain class of cases which are benefited and often cured by sea air either in the shape of repeated sea voyages, or residence on an island or at the sea coast. I refer to :

First—Catarrh of the bronchi in which the finest ramifications are not much involved, *Superficial catarrh*, the existence of which is not past a limited period, from which fact we have a right to conclude that the connective tissue is not as yet seriously involved in proliferation and the formation of cheesy foci. Especially if such cases have no record of hereditary vulnerability ; in fact where the catarrhal condition is chiefly dependent upon a general break down from hard, mental or physical labor, insufficient food, etc., and the lack of strength and nervous power engendered by the breakdown, still predominates over the local lung trouble. Or to express it still otherwise : where the immediate cause predominates over the local manifestations in the lungs.

Second—It happens that previously healthy persons with an abundance of living matter, and with a good family history, pass through a croupous or catarrhal pneumonia and have a remnant left behind, after absorption and expectoration have done their best. Such persons may be thoroughly recruited by a sea voyage or an active life on the sea-shore for a time.

I have drawn your attention to the factors which should govern the choice of climate, as nearly as possible approaching the ideal. They are ;

First—Dryness.

Second—Equability of temperature.

Third—Absence of winds.

Fourth—Abundance of sunshine,

Fifth—Frequent electric changes.

Sixth—Porous soil,

Seventh—Water, pure in quality and plentiful in quantity.

Eighth—Pine odors.

Likewise have I told you that the presence of the majority of these conditions include in a greater or lesser degree the absence of dust, fog or noxious gases : the carriers of infection. The absence of germs has been mentioned, and I have shown you that this is due to our having found an atmosphere of great purity, unmixed and unobstructed ; and lastly that this condition of the atmosphere is undoubtedly due to the unobstructed influences of heat, light and electricity.

In order to avoid frequent repetition, it is well to tell you here that three of the ideal factors are by far more important than the others and they again in turn are of importance in the following order : Dryness ; equability of temperature ; absence of frequent and strong winds. For convenience sake they will be spoken of as the "greater factors" and the rest as "lesser factors."

If now you will ask, where are we most likely to find an approach to such a climate? my answer is : In the *high inland plateaus of the various continents, and upon the high seas.*

Until within a few years, all cases of infiltration or cavity of the lung, which were not destined for a maritime climate were sent south. The general prevailing impression was (for the study of climate had not received any attention) that what the consumptive needed was a mild climate and furthermore that mildness was a monopoly of Southern climes. Even now, this belief is so firmly rooted in the laity,

that it will take decades to remove it. A good beginning could and should be made by removing such erroneous impression from the medical mind. Please understand me to mean, however, that southern climes as such are not to be condemned en masse. It is the old fogy notion of the benefits of mildness which I object to. The climate of any locality is to be measured by the standard of the ideal climate, which we have set up, not as an absolute requisite (not attainable on this globe of ours), but as a collection of qualities, of which a climate suitable for the majority of the consumptives must have at least a majority.

Thus there can be no objection to sending patients south to a warm and equable climate, provided the locality determined upon has not too great a thermometrical range.

Here it is necessary to recur to a point previously touched upon. Though the annual thermometrical range may be within reasonable limits, it may happen that the highest or lowest records of the thermometer, *exist for an unreasonable length of time in succession.*

This is especially often to be found at low or only moderate altitudes of southern countries. The highest thermometrical reading may be from 80° to 85° Fahr. in a certain locality and this may continue for a number of weeks and is by no means well borne by the average patient. In higher altitudes the reverse of great diurnal changes obtains, which changes though thermometrically, are not sensationally great, consequently not harmful to the patient.

Another objection to warm climates is the fact, that warmth is of necessity more or less closely linked with moisture in excess ; another unfavorable factor.

Equally as objectionable as this indiscriminate sending of patients South to an enervating and debilitating climate, is the convenient method of advising residence in the south in winter and in northern climes in the summer ; the idea being to keep the phthisical individual free from extremes of heat and cold. A little thought will at once show the fallacy of this notion. Extremes of heat and cold occur in all ordinary climates, North or South, inland, and upon the sea-shore; at least for days at a time. Moreover it is well-known that the division of the year into seasons is an entirely arbitrary one. March and April are as much winter months in New York as are January and February. The intermediate seasons of spring and fall exist in part in the Eastern Hemisphere ; much less so in the Western, and they have no connection whatever with the months to which they are credited, (such as March, April and May, as spring months.) The only practically tenable division with reference to seasons, is with cold and warm weather.

If the passing of one season into another were in the remotest degree allied to dates, a change from South to North and vice versa might present some therapeutical advantages, but the sad fact remains, that seasons fail to accommodate themselves to dates. A patient finding the heat of a southern locality oppressive for weeks in succession, might come North to find the same oppression prevailing in the opposite direction.

To the phthisical patient who has not reached the latter stages of the disease and who is not suffering from colliquative symptoms, *any change from city to country, from maritime to a continental climate or vice versa will be productive of benefit to him for the time being.*

This beneficial change consists in an *increase of weight and an amelioration of symptoms.*

In other words the improvement under these conditions, is general (improvement of general condition) but not local, as regards the condition of the lung itself.

Drs. C. T. Williams and Brehmer have observed that gain in weight bears no relation whatever to the actual condition of the lung. I have long been convinced that a mere gain in adipose tissue is a hindrance to the absorption of an infiltration, and vice versa. Dr. Williams says in his work upon "Influence of climate in pulmonary consumption" after speaking of the percentage of local improvement in cases treated at home climates: "This forms a marked contrast to the changes in general health, and demonstrates only too faithfully how all the appearances of an improved state of health may be present and yet the disease may continue its insidious and steady march unchecked. We have forty per cent. of locally improved against sixty-five per cent. generally better; and thirty-eight per cent. worse locally against twenty-six and three quarters generally so. The moral is that we must not trust too much to general appearances and that an opinion to the effect that the patient has improved, must not be given unless a very careful examination of the chest confirms it."

You are perfectly safe in the conclusion that both sea and mountain air contain in large measure the requirements for benefiting phthisical cases. In both we have the absence of infectious germs, which is an indispensible factor in all cases and stages of phthisis, both as regards the improvement of the general condition and in the local healing pro-

cess. An aseptic atmosphere is to be looked for at the sea shore and at elevated stations. Their difference is in the factor of dryness, that requisite without which the local process in the lungs cannot be successfully dealt with.

Imagine now, that two roads are open to you for the cure or permanent arrest of consumption ; one by acting directly upon the destructive process by mountain air, which arouses the hearts action and drives the blood through the capillaries ; the other by first improving the general condition and through it turn the destructive into a healing process by the action of sea air. For improving the general condition then long sea voyages stand uppermost, provided you feel reasonably sure that the patient's system will hold out long enough to first have irritability allayed by the sensitive influence of warm sea air and then to receive the benefits of its tonic effects.

By the term "altitude" we dignify all more or less considerable elevations above the level of the sea, ranging from a few hundred to thousands of feet. In order to quench our thirst for classification, Dr. Lombard of Geneva has divided altitudes into low, medium and high altitudes. This division was made with reference to the mountains of Switzerland and its object was to ascertain at what stated elevations, if any, pulmonary phthisis ceased to have an existence. In other words, at what elevation a people could be found with whom consumption did not originate and had not originated for generations. Several such localities were ascertained and the elevation corresponding to this phenomenon was put down as the "line of approximate immunity." In Switzerland this was found to be above five thousand feet.

The reasons for this immunity are variously given; from the belief that the constitution is improved by an increased appetite and more powerful digestion, to that of Walshe and Jourdanet, to the effect that continued inhalation of rarefied air causes increased capacity of the lungs and chest. Kuechenmeister and Brehmer have endeavored to construct a fixed law of immunity from these and other observations.

It is held that for every degree of latitude of approach to the equator, an additional elevation of three hundred and seventy-five feet is necessary to insure immunity. That is not strictly true, as I have shown you when speaking of Iceland and other rare and beautiful climes, where the inhabitants with or without elevation revel in ignorance of shattered lungs and profound cavities. Many facts combine to bring about this immunity, not the least of which is isolation and hardy out-door life. In the mountains at respectable altitudes, dryness and purity of atmosphere are leading factors as you already know.

The *line of immunity*, I desire you to know and remember, *is that elevation in some particular locality or country at which the atmospheric air is free from germs and enjoys the unobstructed effects of heat, light and electricity.* And in addition to this, I tell you that various places within the same degree of latitude often differ entirely in climatic conditions; and, in accordance with the peculiar conformation of a country or locality, every variety of climate may be found in a comparatively small compass.

The most that can be said of an altitude of approximate immunity in general is, that it is found higher up, the nearer we approach the equator from the North or South.

You are well aware that elevated regions have a rarefied atmosphere. Air is twice as rarefied at the height of three and a half miles as at sea level, four times at seven miles, sixteen times at fourteen miles, &c. This expansion of the atmosphere is accompanied by a loss of part of its humidity through the accompanying cooling. In high altitudes therefore, we are likely to find one of the principal of the factors for an ideal climate, namely, dryness. If you would ask me why dryness appears to be the leading factor, I would say that its presence eases the insensible respiration of the skin and of moisture from the lungs. It aids the normal performance of water abstraction from the body.

When altitude treatment was found to yield good results in the treatment of pulmonary phthisis, Dr Brehmer of Goebersdorf promulgated his theory (since abandoned) that the benefits derived were due to diminished barometric pressure. The effect produced was variously attributed to superficial but more rapid breathing or to slower and more profound inspirations. All these manifestations do occur in ascending heights. A variety of influences are here at work, which either cancel each other or are evened out by the regulating apparatus of the body. In any event it is certain that the human organism is quite capable of accommodating itself to changes in the pressure of the air column of 1-10th to 1-6th, the reduction commonly existing at high altitudes. Just how quickly the heart's action will accomodate itself to altitude is to my mind one of great therapeutical value.

The general effects of altitude on man are more readily understood, when we consider the lessened pressure of the air-column, which exists at great elevations. The surface of an

average human being's body may be said to be sixteen square feet, and the presence of the air-column upon a square centimetre of surface at mean barometric pressure 1033 grammes.

At the height of 6,000 feet for instance, the surface of the human body is relieved of a pressure of three pounds to the square inch, which is equal to 7,000 pounds for the whole person. So much for the outer surface. The respiratory mucous membrane of the lung has been calculated by Lieberkuehn to be 1400 square feet. The lungs are the organs chiefly influenced by the reduced pressure of the air column, whereby primarily increased activity in breathing is brought about, which in turn secondarily influences the centres of circulation, assimilation and innervation. In a comparatively short space of time, these functions will have accommodated themselves to the change. The proportions of oxygen, nitrogen and carbonic acid are the same at high altitudes as at sea level. At the height of 6,000 feet, where the pressure of the air-column is diminished one-fifth, a given space of air will, of course, contain one-fifth less of oxygen, and, therefore, at first the lungs must inspire one-fifth more of air to get the same amount of oxygen.

The oft-disputed question, whether *increased frequency of respiratory movements or greater profoundness in breathing*, makes up this one-fifth deficiency, is best decided by first examining the known effects of inhaling rarefied air, and exspiring into the same, at low altitudes. These effects may be summed up as follows: First; The muscles of inspiration are strengthened, inasmuch as the atmospheric pressure in the lungs is lessened, while that on the surface of the chest remains the same.

Second—There is an increased determination of blood to the lungs from relaxation of tension upon the bronchial tubes and air-vesicles. This relaxation allows the lung to contract in the exhaling process, and by expulsion diminish the amount of residual air. Keep in mind now for a moment, that this *increases the capacity for taking in of the air.*

Third—The blood being determined to the lungs, the left heart is somewhat relieved from pressure, and this causes, as we know, at first, rapid action and softness.

Fourth—Elimination of carbonic acid is favored, because of the diminished density of the inspired air.

So we have of immediate effects: Increase of venous blood in the lungs, rapid action of heart, increased riddance of carbonic acid and increased room in the air-vesicles for fresh air. Now let us first, and entirely overlooking the permanent effects for the present, transfer these facts to our high elevation, where we likewise inspire and exspire into rarefied air, but with this difference from the foregoing, that now the pressure on the outside of the chest is diminished. (for convenience sake we will again assume one-fifth.) Then, we will get of the immediate effects mentioned above, only those which are caused by a rather sudden change from a denser to a rarer medium. And these effects are always temporary unbalancings of the functions, are *disturbances of innervation*, pure and simple, manifested by rapid breathing and accelerated heart's action. Increased rapidity of propulsion causes not merely fullness of blood vessels in the lungs, but drives the blood into and through the capillaries; it begets a determination to the periphery. Let us say then that lungs and periphery (lesser and greater calculation both) are

in a temporary state of venous fullness, caused by a disturbance of innervation of the heart and lungs from an unaccustomed change from a dense to a rarer medium. The lungs will rid themselves of this stasis first by taking in oxygen. But the peripheral stasis can only be permanently relieved, after the left heart has acquired more force of contractility, and the right heart is no longer crowded by backward pressure from the lung. Of course, I am fully aware that such conditions cannot exist for any great length of time and I have taken care to speak of them as "temporary." Yet, both the capacity of the system for standing changes of any kind for a length of time, as well as that the compensating hypertrophies (heart) and dilatations (air-receptacles, and subsequently the chest walls), take place in a comparatively short space of time, are facts too often overlooked. The stasis is soon compensated for and answered by dilatations of the capillaries, and their consequent increased capacity for holding blood. In inspiration of rarefied air at sea-level, carried on through a number of months, daily, the effects outlive the respiratory act and in a measure beget hypertrophy of the heart's muscle and a moderate expansion of air-vesicles, through increase of their contractility. Eventually, however, the outside pressure of the air column will regain its supremacy sufficiently to cancel most of the benefit derived, not so in the rarefied air of high altitudes, where the pressure of the air-column is at all times reduced, barely disturbed by any rise of the barometer, because moisture is wanting. Here the permanent conditions will bring about permanent changes, to wit: Hypertrophy of the muscular tissue of the heart, and distension of the pulmonary respiratory membrane, as represented by the air-vesicles.

Now let us not forget that the endosmotic action of oxygen though the lung membrane is of a more rapid and thorough kind in the clear, rarefied atmosphere, the very rarefication of which is a guarantee for its ready passage through membranes. The increased elimination of carbonic acid, at first due to a determination of a large quantity of blood, and answered by increased absorption of oxygen through more rapid inspirations, is now answered by deeper and fuller inspirations, and the taking up of the same quantity of oxygen as before.

As soon, then, as increased frequency of respiration and heart's action approach the normal once more, to be supplanted by deep, full respirations and regular but more powerful heart's action, we are justified in assuming, that *the respiratory function has adapted itself permanently to the change of elevation.* Dilatation of the capillaries and expansion and tension of the air-vesicles with their substructure of elastic tissue have now become permanent, as evidenced by enlargement of the circumference of the chest.

To recapitulate: The lessened pressure of the atmospheric column from without, is answered by increased activity of the organs within, which results in hypertrophy of the muscles of the heart, fullness and subsequent dilatation of the pulmonary and peripheral capillaries and expansion of the air-cells. These changes beget perfect adaptation to the change of elevation, and re-establish the equilibrium previously existing between external and internal forces.

This explanation readily accounts for the varied effects upon the circulation of different persons, and chiefly as regards cases of hemorrhage from the lungs. Every individual

whether safe and sound or afflicted with disease, has to pass through—First, the *functional* changes and second, the resulting *organic* changes. The character of the tissues of the heart and blood vessels, will determine the issue in each case. For the great majority, even of sick persons, great reliance may safely be placed upon the wonderful adaptability of the human organism to all manner of changes. But a heart loaded down with fat, blood vessels whose elasticity has been impaired by atheromatous changes, calcareous deposits, or when resistance to the pressure of blood is diminished by syphilitic or scorbutic changes, or the hemorrhagic diathesis (more frequent than is generally supposed); stumps of occluded vessels, from whose mouths hemorrhage has occurred before—all such may give way to increased pressure, and a hemorrhage be the result.

Here then we have the advantage which in home practice is denied us, of a remedy which will strengthen the heart's action and keep it up permanently. Not temporarily, as by digitalis, but continuously though slowly. This permanent heart stimulation and consequent regaining of its muscular power, is the one element, which high altitudes alone furnish. While marine climates and other inland climates may possess certain elements benefiting certain functions, this one is found at high altitudes only and will serve in great measure to explain, why after all at high altitudes some wonderful cures are effected.

But as there is no sunshine without shadow and no roses without thorns, so with the influence of rarefied air upon the action of the heart. The trouble is that there is always some risk to the heart on account of the possibly too drastic action.

The possibility of failure of the heart's action and the possibility of fatal hemorrhage are mishaps, to which we cannot close our eyes. The very possibility of such occurrences would suggest caution and cause us to permit the patient to reach high altitudes only by slow approaches.

The decision in each case must be left to the intelligence of the physician. He must strike a general average of the patient's remaining strength and resisting powers as compared to the destructive process in the lung and, above all, use his judgment in regard to the muscular strength of the heart and its innervation.

I have spoken of high altitude as possessing the chiefest of our ideal factors: Dryness, and this because *humidity changes with increasing altitude.* In some altitudes this is combined with a reasonable equability of temperature; but by no means in a majority of the same, I wish you to understand, for these would constitute the actual ideal.

The diurnal thermometrical range is often very great at high altitudes. On the eastern slope of the Rocky Mountains for instance the diurnal range reaches as high as thirty-eight degrees. But, as I have previously told you, these changes, though thermometrically great, are sensationally small. As long as your sensations do not convey to you the fact, that the thermometer has made a raid, you may feel quite happy and comfortable in your ignorance. Why is this? Because, for each 375 feet (or thereabouts) of elevation, the decrease in the temperature of the air is calculated at one° Fahr. From this we draw the instructive lesson, that when considering our factor of equability of temperature in connection with high altitudes, allowance has to be made for this fact.

I have shown that the earth has four times the capacity for absorbing heat that water has, and how in high regions, surrounded by mountains, turned up as it were, and presenting their surface to the sun, the absorption of heat goes on very rapidly, and quickly warms the enclosed plateau The *degrees of heat* are, of course; correspondingly *great* and would so be felt at low altitudes, especially when laden with moisture ; but on a high plateau of 6,000 feet, where, in the natural course of things, it ought to be cold, *the higher degrees serve to cancel the one degree of Fahrenheit of reduced temperature for each 300 feet of elevation, and thus what is thermometrically great, will convey only the sensation of comfort.*

Then, at 6,000 feet, we have at 92° Fahr. in the shade, the sensation conveyed the same as if it was 72° minus any appreciable moisture, and plus all the beneficial effects of the intense sunlight. In winter should the thermometer indicate zero, this would be felt as if it were 20° to 25° above zero with the same addition of light and rapid warming of the earth's surface as soon as the sun rises, and its rays pass unobstructed through the rarefied atmosphere.

Or, to make my meaning still plainer : For each 300 feet of increased elevation, the temperature is reduced about one degree of Fahrenheit. The heat of summer, therefore, (as indicated by the thermometer would be the same at 6,000 feet as at sea level, but for this reduction of one degree for 300 feet which at 6,000 feet is equal to twenty degrees. In winter the thing is reversed : on the one hand a low temperature, as indicated by the thermometer, but not by our sensations. These are largely governed by the relative amount of moisture. So we have, on the other hand, as an

off-set to the thermometrical showing : absence of moisture, almost continued unobstructed rays of heat and light, which have to penetrate no mist before reaching us, a more than double expanse of surface absorbing the heat (by the upturned sides of mountains) and the protection against winds which these latter afford.

Besides dryness and reasonable equability of temperature, high altitudes have some of the other of our ideal factors. It is necessary for you to know that a majority of our factors, though too often the less important ones, are equally as well found at localities of low and medium altitudes and of course the presence of any or all of the factors is much dependent upon local conformation, conditions and peculiarities.

The difference in favor of high altitudes is, that here we find some well-defined, positive facts, *common to all great elevations, as against qualities entirely dependent upon local conditions.*

But I desire you to keep continually in mind that what we are seeking in any and all regions or localities, where the majority of our "ideal factors" exist in Nature or else are attainable by civilized influences, no matter whether this be at a dazzling altitude or at the bottom of the ocean. Here then we present such factors as are common to high altitudes and reserve to especial localities their own peculiar good qualities.

Abundance of sunlight is more likely to be found as a uniform factor at high altitudes, than any where else. There the transparency of the air is greater on account of the air being rarefied, (thinner if you like), which of course permits of greater intensity of sunlight.

The quality of the soil differs of course at high altitude stations and is by no means of a porous character in many regions. But the general conformation of high altitude regions is such as to favor natural drainage, on account of undulation of the surface.

Variegated scenery is likewise an advantage common to most regions of high altitudes.

The last but by no means least, of their common advantages, is the frequent changes of the electric conditions of the air.

In many latitudes, as I have told you, there may be found a great variety of climates ; and not only does latitude furnish no criterion as to climates but a comparatively small piece of geography (as one State of our Union) may furnish by its peculiar conformation quite a variety of climatic conditions. "Health spots" (as we may call them) are thickly studded throughout this globe ; and our country, is as much, if not more blessed with them, than are other countries and continents. Such a locality, a health spot, may be very limited in extent, not many miles broad or long and yet contain within it sufficient of the dominent factors for a beneficial climate.

It is clear that if the same advantages incident to long ocean voyages or to residence in high altitudes can be had nearer home, although without sea breezes and at lower altitudes, there are many reasons why such spots should be preferred. These reasons are :

First—The greater number of consumptives come from large cities or at least from the more thickly settled states.

Second—Such patients are used to the thousand and one refinements of civilization, which cannot be cast aside ad libitum.

Third—If absence from home and friends is a necessity, both patient and friends will be better satisfied if the distance which separates them is not that of a continent. We well know how unfavorably a depressed state of the mind will operate upon a patient.

Fourth—In and near centres of civilization, food, drink, comforts of living, and good society must be recognized as generally superior to these same factors in those localities where we find high altitudes, or upon the broad expanse of the ocean.

In reference to health spots more or less independent of altitude, you will find that for the presence of the factor of dryness, shelter by mountains or hills is a desideratum, which protection should be from the direction of the most frequently prevailing winds. A health spot, must be extensive enough, to preclude the possibility of suffering from influences of surrounding sections, differing in their climatic characteristics.

At all times I wish you to remember that the strictest attention to details of treatment, such as are laid down in "home treatment" is equally necessary in other climes and altitudes, as it is at home. It is on account of the necessity for strict supervision, that I condemn indiscriminate camping out and ranch life.

Theoretically it is beautiful and romantic, but practically it is the climax of generalizing nonsense. Even at the risk of being voted a repeater by you, I wish it indelibly stamped

upon your mind that *each individual patient is a law unto himself*, and you are to bring your judgment to bear upon the sum total of his various complaints, independent of all other past or future cases.

Given then, a majority of our ideal factors in a health-spot, near home and well regulated supervision with strict attention to detail, and the sum total will be as beneficial a combination for the phthisical patient as can be found anywhere.

Upon this basis are founded some of the sanitaria for consumptives in Europe, such as Falkenstein in the Tannus, Inselbad near Paderborn; Hastings, Torquay and other localities in Great Britain. You are well aware that our country boasts of no such advantages.

In Dr. Dettweiler's work on treatment of consumption in "closed institutions," the advantages of strict supervision are thus set forth: "If all hygiodietic influences are necessary not only in general practice but in the practice of a specialty for accomplishing the highest percentage of cures, this can only be done under clinical, under institutional conditions where the physician is not only the consulting, but the executive organ, who, by being constantly within reach, makes an uninterrupted contact possible." * "For not only the prescribing and partaking of appropriate remedies are to be considered in the treatment of phthisis; equally if not more important, is the parrying of innumerable noxious influences, which retard or altogether prevent the healing process. Their number is legion, a clear insight into them almost a science in itself, since they lurk in every corner under a fre-

* Dettweiler; Behandlung der Lungenschwindsucht.

quently harmless mask. The vis medicatrix naturæ, the innate tendency of the organism to cancel existing noxiae is to a superlative degree operative in consumption also, and I have long had a firm impression, that a majority of patients with lung troubles die from *disturbances af natural convalescence.* The accidentally or consciously favorable management of these, begets the maximum of good results in health resorts as well as in sanitary institutions ; these convalescents who have successfully combated the acutest stage, from the greatest contingent of favorable cases. The study and scrupulous devotion to this part of phthisical therapeutics is of such supreme importance, that I hold this one point alone sufficient to prove the superiority of institutions. They alone enable us to thoroughly grasp and comprehend the total individuality of the patient, of his mistakes and weaknesses ; the sanitarium alone offers the highest guaranty of success in the position of the directing physician as acknowledged head, clothed with necessary personal authority, who can bring sufficient pressure to bear upon the execution of promulgated orders."

Chief among occurrences which require constant vigilence is "catching cold." This ancient and much abused element in etiology has of late reasserted its right as chief disturber of the peace and happiness of consumptives. The importance of guarding against repeated gastric disturbances, however small, has been pointed out to you. *The consumptives inability of adjusting himself to thermometrical changes, is manifested by repeated irritation and inflammation of the pulmonary and of the gastric mucous membranes.*

This weakness is the direct source of by far the greater

number of relapses, as it is likewise the immediate cause of the incipiency of phthisis in previously weakened and vulnerable individuals.

One of the weakest points in a consumptive of any advanced stage, is his inability to resist and cancel lesser or greater changes of temperature of sudden occurrence. This lack of power of re-action differs in degree in different persons and varies even in the same individual.

The old question of whether bronchitis may lead to consumption suggests itself here. For the solution of this question, I refer you to the first chapter, where you will find that the leading of bronchitis to consumption is a possibility, altogether dependent upon the quality or quantity of living matter, which the patient may bring to the case.

But in the presence of an already existing cavity or infiltration, a superadded bronchitis is to be looked upon as a *full fledged relapse bringing in its train the pathological products of additional pus, of cheesy foci, and rapidly developing imperfect connective tissue.* Here we are not dealing with any so-called dyscrasia or new infection, but with a first-class, old-fashioned cold, caused by the inability of the patient to bring his vascular and nervous system into proper action at the call of a rapid thermometrical change.

Whether the characteristics of a cold consists in a shifting of the individual equilibrium, so that in a given case the local withdrawal of warmth comes to be recognized too late by sensory centres (as advocated by Jaeger) ; or whether the same is due to a paretic or paralytic condition of the vasomotor apparatus of the skin capillaries, is a question which we cannot as yet answer, though we may reasonably suppose

one or both causes to exist. We see the manifestations of these deficiencies daily in catarrh of the nose, larynx and bronchial tubes.

It would be a boon to consumptives who must be banished from home in order to have a chance at recovery, if the locality selected for them on account of its dryness and other desirable factors, were blessed with a well-regulated institution or sanitarium so-called. Unfortunately the most favored localities and regions as to climate are such as are more or less far removed from the centres of civilization. Hence that all important factor, proper food, is wanting, if not in quantity, in such quality as the patient from a civilized country is accustomed to. This is partly the case in the Peruvian Andes, perhaps the most ideal health region thus far known. Even in our own country and Europe the same unfavorable conditions prevail in some choice localities as to food, drink, society and comforts of life in general.

Where reasonably good hotels or farm houses, furnishing milk, eggs, and other animal and vegetable products exist, the circumstances are of course more favorable, but still the patient is entirely too frequently left to exercise his own judgment, especially as regards feeding and exercise. His existence is often a continuation of insults to his pulmonary and gastric mucous membranes and a string of relapses in consequence.

The benefits of a well-regulated sanitarium, as regards the prevention of the above evils and the constant supervision by a skillful physician, cannot be over-estimated. If we are to base our treatment upon individualization and strict at-

tention to detail, as insisted upon by me, this is naturally best accomplished in a well regulated institution.

Still I will not plead for sanitaria as an absolute necessity, since I am aware that outside of them great successes are likewise recorded, as witness Dr. J, H. Bennett's treatment of cases at Mentone in winter time.*

Nor is it necessary to dwell upon the advantages and disadvantages of treating a number of patients under the same roof. Any intelligent physician can reason them out for himself. All I will say is that of disadvantages, possibility of infection is not one ; a subject which we need not here enlarge upon. It suffices to say that the evidence of Dr. Williams, of the Brompton Hospital for Consumptives, of the Goerbersdorf and Falkenstein institutions in Germany, is against that assumption.

It was my intention to dwell at length upon a number of institutions in Europe, where consumptives are treated. But partly because I find that this would form a little volume in itself, and partly because of my conviction that the United States (as also Mexico and South America) have a greater variety of suitable climates spread over a more extended area than any in Europe, you must be content with my naming a few.

In Germany : Goerbersdorf in Silesia at an elevation of 1700 feet. This was the first sanitarium ever started : was opened in 1854 by Dr. Brehmer. In addition to the open air and climbing treatment, the local douche is used there systematically and to great advantage.

Falkenstein—in the Tannus range of mountains, Dr.

* Bennett, J. H.—Pulmonary Consumption—1879.

Dettweiler is director in full charge. In addition to the Goerbersdorf method, great care is given to food and other details in general.

Inselbad near Paderborn in Westphalia is in charge of Dr. Bruegelmann. Chief reliance is placed there upon inhalations, in addition to tonic treatment. Inhalation of nitrogen gas in closed chambers is practised.

Aussee in Styria, is the location of Dr. Schreiber's sanitarium, which is in a very sheltered position.

In England : Brompton Hospital for Consumption and diseases of the chest. This is the institution with which Dr. Chas. T. Williams is connected. He and his colleagues send patients partly to distant climes, but largely to Hastings, Torquay, Ventuor, Bouraemouth and other places on the coast of England, the benefits of which change are largely climatic.

Here mention must be made of the treatment pursued by some French physicians and largely sanctioned by the profession in France. This is their faith in the *efficacy of mineral springs in the cure of consumption.*

At Eaux Bonnes in the Pyrennees, 2300 feet high, the chief reliance is placed upon saline springs containing sulphur.

Mont Doré in the central part of France is 3400 feet above the sea, has muriated alkaline springs, both warm and cold—Pure air and comparative dryness are probably the chief factors. It behooves me to mention however that the late Dr. Niemeyer endorsed muriated alkaline waters in various phases of phthisis ; though he probably had in mind their Power of assisting the weakened organs of assimilation.

The above are not all of the institutions of this kind in Europe, but they are the principal ones where pulmonary phthisis may be said to be treated as a specialty. In other resorts, which we will now mention, other diseases are likewise treated and there is no organized plan upon which consumptives are treated. They are mostly at greater or lesser elevations: Kainzenbad 2480 feet high in the Bavarian Alps. In Switzerland, the most noted place is Davos, lying in a valley at an elevation of 5200 feet. It is well protected from chilly winds by towering mountains and there is, on the whole, an abundance of sunshine. We may put Davos down among the cold, dry climates.

Next come the villages of the Upper Eugadine of which St. Moritz (6000 feet high) is the chief representative. It has Spas and so-called sanitaria; the comforts of life are said to be attainable. Cold, moderately moist, and not enough sunshine.

Of other stations, which were visited and examined by Dr. J. H. Bennett, he mentions Morgins as the best (4500 feet) as combining cool mountain air with a strong chalybeate spring.

The above are only a small portion of the health spots in Europe. In England, Spain, France, Italy, Germany, Austria, and especially in Switzerland, there are a great number of additional health spots, where partial sanitaria (Kur-Haus, in German) advantages of altitude, mineral springs or fine scenery, or all four are the attractions. A number can lay claim to be able to stand the test of the requisite factors of dryness and equability.

Climates fit for the cure or arrest of pulmonary cavities

and infiltrations have partly been tried and statistically proven to be of benefit; in part are now undergoing probation, and again there are such as are entirely unknown climatically, though not geographically. The latter are favored sections and localities in Africa, Asia and South America as good as totally unknown. That other climates are still under probation is owing to two facts:

First—The even now sparsely settled condition of this globe of ours; and

Second—The newness of the investigations in regard to suitable climate. The climatic conditions of regions and stations, which thus far have not had time sufficiently to collect statistical results, should be measured by their approximation to the factors of an ideal climate.

Practically, climates are to be considered as to their average temperature and their relative humidity, the two chief factors. Thus we will speak in general terms of climates being cold, cool, warm or hot, and dry, moderately moist, moist, or very moist.

A short abstract of all foreign climatic stations, outside of North America, will first be given. The climatic health resorts of our own continent will be dwelled upon somewhat more fully.

IN EUROPE.

Eastern portion of the British Channel: Hastings, Torquay Ventuor, Bornemouth - cool, moderately moist.
Malaga and portion of S. E. coast of Spain—warm and tolerably dry.

The so called Riviera including the towns of Hyères, Cannes, Nice, Mentone, San Remo.	Cool and dry.
Islands in the Mediterranean: Malta Sicily (Palermo), Corfu, Cyprus, Corsica (Ajaccio).	Warm, moderately moist.
Mountains of Switzerland Davos The lower Eugadine The upper Eugadine (St. Moritz Maria, Samoden) Weissenberg Morgins	Cold and dry

Mountain altitudes in Austria:
Meran in Tyrol
Aussee in Styria.

IN ASIA.

Hill stations in India: Nilgiri range of mountains	Cool and moderately moist.
Pulney hills. Sandour and other stations at the base of the Himalaya mountains. Parts of Siberia in the Ural.	Cold and dry.

IN AFRICA.

Tangiers—Cool and dry.
Algiers—Warm and moderately moist.
Mogador in Morocco.
Egypt—Hot and dry.
Cape of Good Hope—Warm, moderately moist.
Natal—Warm and dry.

IN POLYNESIA.

Van Diemen's Land	Cool and
New Zealand	moist.

Of some of the strictly insular climates in various latitudes, a few words should be said. I refer to *Madeira, the Sandwich Islands, the Bermudas and the West Indies.* If they are singled out from a great number of islands and island groups, it is because they have been, since time memorial, the Mecca of all patients sent to or seeking of their own accord a so-called "mild climate." In reality they act sedatively, the temporary effects being alleviation of irritation and consequent diminution of cough and a deceptive increase in weight, which bears no relation whatever to the excavation or consilidation in the lung.

The climate of the *Island of Madeira* is a warm, very moist one, with all the sedative influences followed by the enervating ones. Nothing of the bracing influences of the sea-air manifest themselves here, nor upon the other islands I am about to mention. The mean temperature in winter is 60°.6 Fahr., the rainfall quite great. Of all the results which have been published about Madeira I find no positive evidence of any cures and a shockingly small percentage of "improved."

The largest is that of patients sent from Brompton Hospital, some 53 per cent. of all kinds of "improved"

The *West Indies* are in most respects quite similar to Madeira, except that their winter temperature averages higher. A good word may be said for Cuba and Jamaica. In these islands we have that type of marine climate with some of the bracing influences of salt-air ; that is in the more elevated,

hilly portions of them. The average winter temperature is 64 degrees.

Nassau, the principal town of the Bahama Islands, has however been the beau-ideal of mild climates. Everything of a disadvantageous character appertaining to such climates is true of Nassau. The statistics so far as available, of consumptives seeking relief there are beyond criticism. True, the monthly range is small in winter (from 9° to 18°), but the monthly mean, also in winter, lies between 76° and 79°. A truly tropical climate, with neither the benefits attached to salt-air, nor the advantages of elevation due to local conformation.

The *Bermuda Islands* are some 600 miles from the nearest land, from North Carolina, in latitude 30° W. What has been said of Madeira applies here, save that the comforts of life, food and society are better, the residents of the chief place, Hamilton, being English. The islands themselves are numberless, but 20 of them are inhabited. In the winter months, the mean temperature is sixty degrees; in summer rarely above 85°. As you know, the Gulf stream flows between these islands and the American coast. Hotel accommodations and society are good. The possibility of a change to the mountains in summer, would make the climate of these islands one of the most desirable; but here the absence of the artificial factors and extreme isolation act as a preventative.

The *Sandwich Islands* deserve separate mention for the additional reason that they actually possess all of the virtues centered in our ideal factor, except sufficient elevation above sea-level. Equably cool and dry is what we can say of one

part of the islands. For they have two climates. On one side it is quite dry, on the other almost constantly wet. The northern and eastern portions of the islands receive the full force of the constant trade-winds, cold and moisture is deposited, leaving the other side dry. In the dry region it does not rain more than a couple of times in the year. The warmest days in summer do not exceed the warmest days in winter by eight degrees. Mean annual temperature about seventy-five degrees.

The continent of *South America* deserves separate consideration, if for no other reason, than for having within its borders certain sections of country where a close approximation to an ideal climate for consumptives is reached.

I have reference to the ranges of the Andes (Cordillera de los Andes) with their trend from north to south, extending from 10° N. latitude to 45° S. latitude. These mountains do not occupy a far inland position, but may be said to run quite close to the Pacific coast. Here we find in many localities at high elevation an *equably cool* and *dry climate*, with all the advantages of salt-air without moisture from the ocean, and of high altitude with its advantages to the functional action, followed by organic changes of the heart,

The explanation for this happy combination of factors is :—

First—In great part the Andes consist of two chains of mountains running from north to south, with plateaux separating the two ranges. Moisture from the ocean does not reach these plateaux, nor the west side of the second range. Hence dryness.

Second—Such moisture as exists on the west coast,

serves to equalize the temperature by preventing rapid radiation. Hence a certain equability of temperature.

Third—High altitude, which on the one hand, increases the chances of dryness, as you know, and on the other adds to coolness of the atmosphere, which otherwise under the equator would be very hot indeed.

Fourth—The drainage of the Andes, is nearly wholly carried down the eastern side, forming the great rivers Amazon, La Plata and others. Thus rapid drainage, freedom from these bodies of water as sources of moisture are additional reasons for dryness.

Fifth—These several conditions: the double chain of mountains with plateaux between, high altitudes in conformity with the proximity to the equator, the latitude of the Andes, begets local conformations so varied, as to insure every variety of climate. Many stations therefore can be found where protection from stormy winds is had.

Sixth—The great extent of these elevated plains has caused the building thereon of cities and towns, in fact many of the principal ones; thus insuring many of the comforts of life.

Factors of disadvantage for Americans are:

The great distance from home and comparative inaccessibility of the stations as yet.

Strangeness of social conditions and language.

Difference in the character of the food.

So much for the benefits and disadvantages of this most favored climate. I will give a short sketch of a number of stations, for the material of which I am indebted in part to the politeness of a Peruvian gentleman now residing in this

city ; in part to extracts from Dr. Williams work on climatic influences.

The capitals of three of the states are suitable places as sanitaria. *Quito*, capital of Equador, at an elevation of 9451 feet, with about 80,000 inhabitants. Mean annnal temperature : 60 degrees, which is also the mean of the seasons ; no annual range to speak of.

La Paz, the capital of Bolivia, at 13,325 feet, dry but rather cold.

Santa Fe di Bogota, capital of New Granada, 8,648 feet high, with 40,000 inhabitants, is situated on a plain 60 miles in length. Here the mean annual temperature is 59 degrees with an annual range of one degree, thus capping the climax of *equability and coolness*.

Both Quito and Bogota I am told, are reasonably accessible and well provided with all the comforts of life.

Peru is even more fortunate in the number of its health stations for consumptives, though they are not always so accessible. The late war with Chili has prostrated and crippled Peru for many years to come. Still we may hope that under the new order of things, the extension of railroads already existing will improve accessibility to these favored regions.

Tarma and Jauja are said to be the most favored of all stations, on the evidence of Dr. Archibald Smith, Dr. C. T. Williams and of two private gentlemen of my acquaintance. The late government of Peru had a sanitarium for military consumptives at Jauja.

From what I can gather, however, of meteorological data as regards equability of temperature, I am inclined to regard Quito and Bogota as superior. The thermometer at Jauja

sometimes falls to 28 degrees and seldom above 57 Fahr. Rapid drainage to the east occurs. But the prevailing winds are sometimes powerful and of great velocity. Jauja is on a plateaux, separating the two chains of the Andes.

Tarma is some twenty miles north-west of Jauja, at an elevation of 10,028 feet. The climate is equally as variable as at Jauja.

Other populous towns and villages exist in the lofty plateaux known as the *Montana*, which in time will be rendered accessible. Their average elevation is about 12,000 feet above sea-level.

The republic of *Mexico* is a country, whose climate much is to be expected of in certain elevated parts, as soon as modern civilization shall have gained a surer foothold there.

For it is one of those countries, where proximity to the ocean and local conformations beget a great variety of climate. The climate of Mexico is essentially a tropical one. We are therefore compelled to pass by its tropical heat and sea-moisture at sea-level and on the general surface, and look to altitude for the proper combinations for an appropriate climate. And being in great part in the neighborhood of the equator, the altitudes to be looked for must be high ones.

Among them we have equable coolness and only moderate moisture, with all the bracing influences of salt-air. But save in the large cities, accessible by rail-roads, all the artificial factors are wanting.

The same system of mountains, which are called Rocky Mountains in our country and Cordillera de los Andes in

South America, traverse Mexico. Six hours ride from the port of Vera Cruz is *Orizaba* in the Sierra Madre range, four thousand feet high. At this elevation the climate is equable all the year round and no yellow fever occurs there. The air is not so rarefied as it is on the higher plateaux of Mexico ; hence it is a good place for patients to gradually accommodate their heart's action to elevation.

Almost enclosed by lofty peaks, on an extensive plateau of from six thousand to eight thousand feet high west of the Sierra Madre, lies the *old City of Mexico.* While nearly all of our artificial factors are here at hand, in connection with those of nature, I am informed that on account of the character of the surrounding lower country and some local peculiarities, the city is not a very desirable one for consumptives. Mexico is seven thousand five hundred feet above sea level.

Puebla lies south-east of Mexico at about the same elevation. It is a well preserved, well built and clean city. *Cholula* is three leagues distant from Puebla.

Cordova is at an elevation of two thousand seven hundred and fifteen feet.

In the northern part of Mexico, in the state of Chihuahua, bordering on our New Mexico and western Texas, are to be found some of the same favorable attributes, which obtain in the Mesilla Valley and Western Texas. Among the foot hills and upland plateaux, lying between part of the Sierra Madre and the Sierra de los Mimbres, we have a variety of altitudes and various degrees of dryness.

Especially worthy of mention, is the North-east corner of Chihuahua bordering on the Rio Grande.

Favorable results have been attained in these high table lands of which the town of El Paso is the centre.

STATIONS IN THE UNITED STATES.

We come now to the enumeration of stations on this continent and here it is desirable to go into detail as much as possible, as regards each individual region or health-spot. I must premise however, upon which reasonable deductions might be made in regard to such climates which can show the needful ideal factors. To avoid cumbersome detail I will give climatic attributes in short sketches, reserving for a future publication (at which I am now at work) an extended account of every desirable region.

A good general view of the subject is to be found in Waltons "A comparison of the European and American climatic Resorts," (Philadelphia, 1877), a portion of which is here given unabridged.

"On a general view of the temperature chart, one is likely to be impressed with the fact that the European resorts are much more equable than the American. Whilst the mean monthly ranges of the most popular European winter stations lie between eight and eighteen degrees, those of the American resorts fall between twenty-three and forty degrees, with one exception, that of Nassau, Bahamas, which ranges between nine and seventeen degrees. This we would expect to be the case, as it is well known that the whole North American continent is subject to extreme fluctuations in temperature, which are unknown in Western Europe. The cause is not far to seek. The trend of the mountain ranges throughout this country is from North to South in parallel lines, forming broad avenues, up and down which the winds sweep in unimpeded course from the equator to the pole; whilst in Europe the mountains lie east and west in frown-

ing battlements, which roll back the fierce north winds on the plains of Germany and France, or toss them high in the heavens, to be lost amidst the warm winds from the great desert, leaving the winter stations, which nestle on the north shores of the Mediterranean untouched by their frigid breath. Another influence tending to equalize the temperature of the European resorts is the most land-locked Mediterranean sea, upon the coasts of which the European stations mostly lie. The effect of the evaporation of such a vast volume of water in absorbing latent heat on the surrounding shores—need only be mentioned. The Gulf of Mexico, on our coasts, does not compare with the Mediterranean in this regard, for the current of its warm waters flows directly away from our coasts across the Atlantic; and the western winds, which, according to Blodget, prevail there during the winter months, sweep much of the beneficial effects of its moisture-laden air far out to sea.

"When we direct our attention to the rainfall, we perceive that the European stations are much more subject to rain than those of our own country. The majority of the stations in this country average between one and two inches per month, whilst those of Europe range from two to four inches per month. However, we are not to conclude from this that the humidity of the air at European resorts is greater than at the American; for it is a well known fact that the atmosphere may be heavily laden with moisture, and yet little precipitation occur. Neither should we conclude that a considerable precipitation indicates a great deal of cloudy weather, as in tropical showers a large amount of rain may fall in a few hours. For this reason a chart or table

showing the average number of rainy days for each month is desirable ; but the facts necessary to construct such a chart are not obtainable."

In the enumeration of the various stations and their advantages, there is no need of division into insular and continental climates, of sea-shore or mountain altitudes, since that will appear from geographical location.

Of the climatic advantages of our continent in general and of the United States in particular, there are a few general points, which I wish to impress upon your mind as foundations upon which to build.

First—You have been told that sea-air and mountain air at high altitudes furnish a pure, aseptic air, an atmosphere relatively free from infectious germs.

Second—Our country has an extensive sea-coast with both favorable and unfavorable relations to that warming agent, the Gulf stream. The trend of our mountain ranges is chiefly from North to South.

Third—Both sea and mountain air can furnish the ideal factors of coolness and dryness, or an approach thereto. The choice of such localities is largely governed by the frequency and velocity of prevailing winds, bringing with them as they do the rapid thermometrical changes (so hurtful to consumptives) and moisture ; thus tending to destroy equability of temperature on the one hand, and dryness on the other.

Fourth—Theoretically then, we would find dryness coupled to a certain equability of temperature upon this continent chiefly in three kinds of places, in accordance with the physical geography.

First—Stations near or still within reach of the bracing influences of salt-air, but sheltered and partly surrounded by mountains; stations where the prevailing winds are not carriers of a moist atmosphere, but blow sea-ward.

Secondly—Stations situated between two separate chains of the same range of mountains, where one chain receives the deposit of moisture from the ocean. But as the trend of our mountain ranges is from North to South, some spur of mountain continuity should be so placed across the regular range, as to keep off north and north-west winds. And so it is with—

Thirdly—High mountain plateaux, whose *far inland position* render them free from any suspicion of ocean moisture and where elevation and rarefied atmosphere take the place of the salt air in the matter of insuring a pure unadulterated air. Here also, the probability of equable coolness is rendered more certain by a spur of foot hills thrown across the range as it were, for protection against North and North-west winds.

The above is a theoretical general basis. Now let us see what we know of health resorts thus far. (It is necessary here to repeat that the bulk of this work will not allow of giving local statistics, which I have at my command, nor of giving vent to my individual belief in the efficacy of a particular locality in the mere enumeration. Both points are reserved for a future publication).

On the Atlantic coast from Maine down, I know of no locality which has received a trial. The first we reach from above downward, so to speak, is

The Adirondack Mountains. in the Northern part of New

York. To a certain portion of them, known as the St. Regis region, Prof. Loomis and others have sent patients for some years past. The results in arrest of phthisis have been quite satisfactory. A few total cures have been effected. The climate in that region may be set down as equably cool and moderately moist.

In the summer, minimum and maximum temperatures are about 50 to 70 degrees : the winters are equably cold. The altitude of the St. Regis region is about one thousand seven hundred feet above sea-level.

The *Ramapo Valley* at the foot of the Ramapo Mountains in New York, about thirty miles from the City of New York. The New York, Lake Erie and Western Railroad have a station there, called Sufferins, which is protected to the west, north and east by the mountains. The thermal variations in winter are small. We may set the station down as dry and cold.

In New Jersey several stations in and about the *Orange Mountains* have obtained quite a repute. I find upon careful inquiry that superficial catarrhal conditions and general breakdowns do well there. Their best feature is shelter from frequent and strong winds, preventing in a measure those sudden changes to which consumptives so illy adapt themselves.

Pennsylvania contains the largest portion of the Alleghany Mountains.

It is wonderful how little is known of the many localities which exist in the Alleghany Mountains, passing as they do through the greater portion of the width of the States of Pennsylvania and Virginia, and sending side ranges and

spurs into West Virginia, North Carolina and Tennessee. No trials worth recording have been made to locate suitable stations for phthisical subjects.

Two distinct mountain chains belonging to the same mountain system, traverse the State of Virginia: The Blue Ridge in the eastern part, the Alleghanies west of these. Theoretically it would seem as if the Blue Ridge should catch the moisture of the ocean and thus render the eastern slope of the Alleghanies dry; practically no specified treatment for consumptives has been initiated, and no statistics exist for this region.

In Virginia certain localities in the Alleghanies are populated and resorted to, which contain the various mineral springs. Something of the specific treatment system is carried on there with these waters, as it is in France, only not upon an organized plan. *Red Sulphur Springs* is worth mentioning, as possessing therapeutical action not often met with. It is claimed that these waters exert a direct action upon the innervation of the heart and reducing its action; while their sedative effect allays irritation of the pulmonary and gastric mucous membranes. These effects must be due to a very delicate and volatile chemical composition. In its decomposition ammonia is formed and hydro-sulphuric acid is liberated; or, if heat be employed in the experiment, sulphur is separated.

In the middle and western portion of *North Carolina* we find the *Blue Ridge Mountains*, and in its range various stations which, as regards climatic factors, may be denominated as cold and dry. The mean in winter is about 43°, in summer 75° Fahr.

Asheville, in a valley near the French Broad River, at the southern extremity of the Appalachian chain, was until recently the location of the "Mountain Sanitarium for Consumptives," conducted by Dr. J. W. Gleitsmann, now of New York. Elevation: 2,250 feet.

Dr. G. tells me that the average relative humidity is 69 per cent. at Asheville, which would not entitle that station to be placed under the head of dry, but rather of moderately moist and cool. "The temperature in winter rises during mid-day, with few exceptions, to 50° and over, and in sheltered places with southern exposure, where patients congregate, to 70° and 80° in the sun. The greater number of days in winter have clear and bright sunshine, and insolation being notoriously more powerful in the highlands than in the lowlands, makes out-door life all the more pleasant."*

Coming to *South Carolina*, we reach the border of the warm Southern climes, which are so objectionable in my eyes for two reasons:

First—The mean summer temperature is too high (75° to 85°), whatever the annual mean; thus making felt the debilitating and enervating influences of a hot climate. The results attained in the treatment of consumptives is one of the chief points in evidence against hot and dry, as against cool or even cold and dry climates.

Second—The malarial influences prevailing over the lower and moister region of these States, which influences are in a great measure carried to higher altitudes also, on the wings of the wind.

* Biennial Report of the Mountain Sanitarium for Pulmonary Diseases, Asheville, N. C., by Dr. W. Gleitsmann.

However, the Blue Ridge Mountains with the sandy soil of the elevated portions of the State towards the north and west, are dry and porous. Two other factors in their favor are the presence of pine trees, adding to the air being fit to breathe, and a variety of scenery.

Aiken occupies a high sandy ridge near the Savannah River. In equability of temperature and comparative dryness, it has been held by Walton to be more nearly similar to the Riviera on the Mediterranean than any other resort on our continent. The annual mean temperature is sixty-five degrees, which mean is begotten from a summer temperature too high for the ideal, and classes Aiken among the hot and comparatively dry. The town of *Spartanburg* is in a region where the air is cooler; a nearer approach to the ideal than at Aiken. So is Greenville (160 miles from Charleston); the trouble is that at the latter places the comforts of life are not as attainable as at Aiken.

All that has been said pro and contra about mild Southern climates in a previous chapter, applies to *Florida* as a health resort and I refer you to that chapter. Of elevations there are none in Florida, save near the boundary of Georgia, and even there the greatest altitude is three hundred feet. Too hot and moist is the correct verdict, for which equability and mildness are no compensation. The equability moreover is in summer, when 92° are reached and adhered to. In winter 31° is the lowest. Of beneficial factors of several stations I must mention: freedom from sudden thermal changes, a reasonable amount of sunshine, porous sandy soil, presence of pine forests and fresh tropical fruit. I repeat however, as in a preceding chapter, that the only suit-

able cases are superficial catarrhs of limited standing and remnants of pneumonic processes in constitutions hereditarily healthy, but below par from the effects of the lingering acute trouble. And for such cases even, Florida is fit in the winter months only.

Localities favorably mentioned are Magnolia on St. John river ; Jacksonville and Pilatka.

Georgia is a state much less known than others climatically, and yet it is within its borders that I firmly believe a close approach to the ideal climate for consumptives can be found in more than one especial locality. For in addition to geographical location in general, as affecting the mean temperature, there are elevated plateaus, sheltered in directions which render them safe from such winds, as carry moisture, and such as produce sudden changes of temperature. The mean temperature in the central and northern part of the state is 50° in winter, and about 75° in summer. The latter is rather a high one for the mean of a season, but it does not apply to all localities. Another factor is the presence of extensive pine woods, extending along the eastern and middle portions of the state from one end to the other. That consumptives derive benefit from an air charged with the odors of pine trees is not to be denied and is owing to two causes :

Firstly, the terebinthine odors exercise an effect inimical to the development of the lower forms of animal and vegetable life—thus rendering the air relatively pure and antiseptic.

Secondly, as stated in a previous chapter, continuous respiration in an antiseptic atmosphere may yet lead to results hitherto unattained. The odorous part of the pinus

palusties and other varieties, is the resin turpentine and the volatile oil therein contained. We know how valuable oil of turpentine is as an allayer of irritation of the pulmonary mucous membrane, besides being an arterial stimulant of the first order.

Atlanta appears to me to be a suitable place; or still more so the village of Marietta, near the Kenesaw mountains, not far from Atlanta by rail, and 1,132 feet above sea-level. At Atlanta the annual mean temperature is 61°. The winter mean is 45°, and the summer 75°. Mean relative humidity about 56 per cent. Rainfall 4 inches. Augusta, the capital of Georgia, and Athens are clean and beautiful cities, where the comforts of life are attainable. Among the sand hills, 2½ miles from Augusta, in the extreme eastern part of middle Georgia, stands the town of Summerville, a few miles from Augusta. I make this extract from the "Hilly Pine Region of Georgia and South Carolina," by Dr. S. E. Habershaw: "This plateau is, properly speaking, the true summit of the hills in the State, being the highest point attained by it. * * * The gradual slope of the plateau to the south and east, the sandy nature of the soil, with the pine and oak growth (black jack), make it extremely dry and well adapted for those pulmonary sufferers who require a very dry climate and low dew-point." A letter in the same pamphlet from Dr. L. A. Dugas, contains this passage: "This favored belt commences at the primitive region, where the rivers of the Atlantic Slope tumble over the last ledges of granite rock, that is to say, at Augusta, Milledgeville, Macon and Columbus—and varies from 30 to 60 miles in width below the shoals."

At Summerville the mean annual temperature is 64°, with a range of 34° (minimum of 46°, maximum of 80°, evenly distributed throughout the year. Number of clear days, 238.

Northern Georgia is about 1,100 feet above sea-level. It is chiefly in the Kenesaw mountains, at a moderate elevation, that I look for some of the future ideal resorts, which shall be classed among the cool, dry and balsamic.

Next to, and on a par with northern Georgia, the eastern portion of *Tennessee* claims our attention.

In eastern Tennessee, at an average elevation of 2,000 feet above sea-level, are what are called the Cumberland Table Lands, extensive plateaux in the mountains of the same name. I have before me an essay by Dr. C. M. Wright, of Chattanooga, "A People without Consumption" demonstrating that upon a certain portion of these table lands, known as Walden's Ridge, consumption is not an indigenous disease among the inhabitants. The climate permits them to spend most of their time in the open air. As far as my present information goes, the climate of the elevated plain is *equably cool and tolerably dry.*

As might be expected, none of our chief factors for an ideal climate are found in the States bordering on the Mississippi River, in the so-called Mississippi Valley. But far up in the north, at such distance from either ocean as to insure absence of moisture from that quarter, and at a respectable elevation, in parts at least, we find the *State of Minnesota.* Here we have a true example of the cold and dry climate. The objections to a climate where the mean temperature is low have been stated. It is absolutely necessary

that consumptives should be able to be out in the open air a greater part of the time. In cold climates, however dry, this requires a certain amount of bodily vigor, which again implies a reasonable stock of vitality and capacity for resistance and reaction. The advantages which Minnesota has to present are: far inland position; general elevation of one thousand feet above the level of the sea, and in the northwestern portion of 1,450 feet; and an abundance of pine forests. The mean annual temperature is about 44 degrees; the diurnal variations are quite small. There are no sudden changes of temperature, the annual range of some 54 degrees being evenly distributed throughout the year.

I will here state that thus far the statistics of Minnesota as a sanitarium are very unfavorable. One cure in fifteen. Of course this is due to many circumstances, relating partly to the patients themselves, in part to the absence of our minor factors.

Of places more sheltered than others, I name St. Paul, Red Wing and the Hassan Valley.

From the sources of the Father of Rivers we turn our attention to the region west of its mouth, the *State of Texas*. The western part of Texas, bordering on the Rio Grande, is a region of moderate altitude of from 1,500 to 2,500 feet. Here the climate is *warm and dry*. Upon this elevated plateau stand the German towns of Boerne, on the beautiful Comal River, and Fredericksburg. The comforts of life, the purest of water and variegated scenery are to be found in this region. Perhaps the best feature of this section is its undoubted equability of temperature. Another little paradise is Kerrville, not far from the above, in the Upper Guadaloupe Valley.

Thus far we have had to deal with regions where either sea air or moderate elevations with or without the influence of salt water air; or, with the same, enjoying the additional advantages of an air continuously impregnated with the odors of pine forests.

We now come to a climate purely and strictly representative of the benefits of mountain air, independent of salt-air, mostly of great altitude, as compared to what we have seen, and dry from the fact of its great distance from either ocean alone, aside from other factors.

The *Rocky Mountains* traverse the States of Wyoming, Colorado, New Mexico and send spurs into Arizona. They are over 100 miles across and contain among their foot hills and the approaches to them, among their elevated plateaux in the mountains proper, as well as on their eastern and western slope, all imaginable climates so far as temperature is concerned. In order to be systematic, we will consider in turn:

First—The relations which form an approach to the mountains from the east.

Second—The eastern slope of the Rocky Mountains and the stations among its foot hills.

Third—The plateaux and natural basins at the top of the general range.

Fourth—The Western slope.

The whole vast plains from the Missouri river to the foot of the Rocky Mountains is not, as was once supposed, and as it certainly looks to be, a dead level. There is a gradual and even rise, until at the foot of the mountains an altitude of 4,000 feet has been reached. The whole western half of the

State of Kansas and Eastern third of Colorado are representative of this gradually rising enormous plateau at a general elevation of from 1500 to 4000 feet.

Let us apply the test of our factors to this region: Dryness is secured ; not relative, but almost absolute dryness, so far as moisture from any large body of water is concerned. Distance from the great seas insures that.

The mean annual temperature in Western Kansas may be set down as 49°, and with a moderate range throughout the year. But this range is not evenly distributed throughout the twelve months, but is the result of great diurnal changes, and these again are in great part due to winds of great frequency and still greater velocity. This latter feature alone almost counterbalances the presence of other beneficial factors, for the reason that in summer this air is wretchedly hot, caused by the free and unobstructed radiation of heat from these naked prairies ; and in localities it carries with it dust in unlimited quantities. No mountainous shelter breaking the force of the winds, they have it all their own way as regards velocity. In cool and cold weather, as you know, sudden changes cannot be counterbalanced by the average patient ; and you likewise know that velocity of wind has a great deal to do with too rapid withdrawal of warmth from the body.

On the whole then, considering the beneficial factors present as against those absent, I will say consumptives may with advantage to themselves seek one of the more populous towns (of Western Kansas for instance) for such length of time as will be required to strengthen and lessen the rapidity of the heart's action ; this time should not be above a limited

number of weeks, and not be in the middle of either the hottest summer or coldest winter season. I mention "populous towns" advisedly, because on the one hand the comforts of life (food, society, medical attention) can only be had there, and on the other no variegated scenery need be looked for in the country, either in the shape of woods or water. Again, the former style of traveling by slow approaches in wagons or on horseback might be reviewed; but it involves the absence of many important minor factors, so that, save in exceptional cases, I do not think well of it. Of more or less populous towns on these elevated plains, I would mention: Abilene and Wallace, on the Kansas Pacific Railroad; Dodge City and Emporia, Kansas, and Las Animas, Col., on the Atchison, Topeka and Santa Fé Railroad.

Second—The Eastern slope, in which we include: The towns at the base of the mountains, the foot hills with their enclosed parks of lesser dimensions up to an average altitude of 6,000 feet, and the towns among the foot-hills.

Foot-hills in this instance must not be confounded with hills in other parts of the country, where they would be rated as high mountains. You must remember that the valleys and table-lands among the foot-hills are as high as ordinary mountains elsewhere.

For much that might be said of the eastern slope of the Rocky Mountains, the highest general altitudes, as well as of the western slope, I refer you to the chapter on high altitudes for a synopsis of general characteristics and of beneficial effects of mountain air in general. Our concern is therefore in the first place to apply the test of the greater and lesser

ideal factors to each region, and in the second place to name a number of stations known to possess certain advantages, as well as such as are likely to possess them in the future.

Dryness on the eastern slope of the Rocky Mountains is, practically speaking, almost absolute. This greatest of factors is its chief recommendation, and its importance cannot be over-estimated. The reason of this dryness results from its physical geography, and is two-fold :

First—Absolute inland position ; such distance from any great body of water, as is not equalled by any region upon any continent upon this globe.

Second—Any moisture from the Pacific or the country west of the Rocky Mountains is cooled and condensed as the air crawls up on the western slope, thus leaving the eastern slope dry.

As regards equability of temperature, this cannot be said to exist to any satisfactory extent. The annual mean of elevated stations on the eastern slope is about 47°, and certainly not above 49° (49.2° at Santa Fé, N. M.), while the annual range is about 119 degrees. If, as I have told you, we apply the rule that every 375 feet of elevation brings with it a decrease of temperature of one degree, we can readily understand the occurrence of low temperatures. But applying the rule to our sensations, we approximate the truth when we add one degree for every 300 feet of elevation above sea-level. At the freezing point, therefore (32°), our sensations would be on a par with 52 degrees. The great annual range would indicate a high thermometrical reading in summer ; this is the fact, and the reason thereof is also two-fold :

First—There is no moisture to intercept the sun's rays, which pass unobstructed without losing any of their power.

Second—The greater the surface presented, the more heat can be absorbed, and this condition is present in the shape of the numerous upturned sides of the mountains, presenting a greatly increased surface for radiation of the absorbed heat. A temperature of from 88° to 92° ought to be felt severely; but we apply again the rule of one degree of cold (or reduction of temperature) for every 375 feet of elevation, which would make 92° convey the sensation of 72° at sea-level.

The higher degrees serve only to cancel the one degree of lowering for every 300 feet of elevation, and thus what is thermometrically great will convey only the sensation of comfort. Our sensations have to be "corrected for elevation."

The diurnal range however is of course great (as high as 38°). "Of course," I say, because a cloudless sky and dry atmosphere beget on the one hand a rapid warming of the earth's crust and its multiplied expansion in mountainous regions, on the other an equally rapid and complete giving out of the same at night time.

You will now say: Well, if dryness and an abundance of sunshine are incompatible with equability of temperature, the ideal factors can never be made to harmonize. No, they cannot; at least not at high altitudes, but I attach a much greater importance to dryness as a factor, especially when connected with *intensity of sunshine.*

Abundance of sunshine is one of the factors present. As the sun shines in a usually cloudless sky (the number of clear days has been as high as 303 in certain localities in

Colorado. I myself have seen 33 clear days in succession), there is a proportionately longer influence of sunshine in each 24 hours.

Thus we have even on. winter days, when the sun is clearly visible for 8 hours only, a sunbath, which, in its intensity, purity and fullness of effect makes amends for the deficiency in time.

But now we come to the bad factors: In many parts there is a frequency and velocity of winds which are little short of beastly; and the charm is not increased by volumes of gravel dust. I do not accept the maxim that the wind exercises much less force on account of the reduced weight of the atmosphere, due to elevation, as a medical fact. Rapid cooling of the body takes place as rapidly in rarefied as in ordinary air, and its dryness abstracts moisture all the faster.

Other disadvantages are the absence of the lesser ideal factors. Too great a distance from the present centres of civilization, doubtful food (of which lack of fruit is one of the worst), scarcity of water, and equal scarcity of soft and reduced scenery; too much grayness and baldness, too many rocks and not enough water.

The rainfall throughout the year is barely sufficient to sustain sparse vegetation, and not always that.

I have dwelt thus at comparative length upon the ideal factors present and absent on the eastern slope of the Rocky Mountains, because this region is the best representative type of high altitudes. In speaking of the general range, these matters need not be repeated. If indeed I am guilty of a repetition of some statements already made when speaking of high altitudes in general, my excuse is that this application

in loco made it easier to understand, and also because it is well to point out the approximation to an ideal climate. The average height of the Rocky Mountain range is about 11,000 feet, which represents the timber line. Of course mountain tops like Pike's and Long's Peak and Mt. Lincoln tower above the range. At elevations ranging from 7,000 to 9,000 feet we find the great parks, plateaux of enormous extent, mostly well timbered. The large parks are the North, Middle and South, and San Luis Parks. Among those of lesser dimensions we have Estes' Park, Manitou Park, and a great number of others.

All that has been said in regard to the eastern slope applies here, this region being in reality a part of the slope. I mention it separately chiefly to draw attention to the inhabitable altitudes of great elevation. Remembering what has been said of approximate lines of immunity, in Colorado this may be set down at 6,000 feet; in other words, the best altitudes for consumption are between 6,000 and 7,000 feet.

Of localities in Colorado I would name: Boulder, 5,536 feet above sea-level.

Denver—5,200 feet; capital of Colorado. Comforts of life attainable. Good food, excellent society. Bad water, and still worse drainage.

Colorado Springs—altitude 6,000 feet. Beautiful town, but very windy.

Manitou—6,124 feet—6 miles from Colorado Springs, in a nook of the foot-hills. Well sheltered. Iron, sodium and magnesium springs.

Pueblo—4,400 feet. Windy and dusty.

Cañon City—4,700 feet high. Dusty, but well sheltered. Good in winter time.

Puncha Springs—8,000 feet above sea-level. Sixty miles west of Cañon City.

Pagosa Springs, in the San Juan country ; altitude about 7,000 feet.

Estes' Park, at an elevation of 7,500 feet above sea-level.

Manitou Park—7,752 feet ; reached through the Ute Pass from Manitou.

In New Mexico :

Santa Fé—7,000 feet above sea-level ; Las Vegas, Albuquerque and Ojio Caliente.

This latter place is within a region of country which is likely in the near future to become one of the ideal *cool and dry climates*. I refer to the north west corner of New Mexico ; roughly speaking, so much of it as lies between Colorado and the 35th degree of latitude from north to south, and from the Rio Grande del Norte to the Arizona State line from east and west.

Again as a *warm dry climate*, the Mesilla Valley in southern New Mexico has an undoubted future. Here, as in parts of Arizona, the sun shines almost every day in the year. It is here that the dryness of the air is such that flesh does not decompose, but becomes dessicated by water abstraction. The bodies of the dead were formerly exposed in this valley and surrounding country, and became as mummies. Another advantage of this region is, that vegetables and fruit flourish to an unlimited extent. The finest and largest grapes are raised there. The valley itself is from one to six miles in width, and 70 miles long. In elevation it rises from 4,000 to 6,000 feet from the Rio Grande upwards to the foot-hills. New Mexico and Arizona are only beginning to be suffi-

ciently civilized to furnish in addition to the ideal factors, lavished upon them by nature, some of the lesser factors, relating to home comforts and ready communication with the rest of the world.

But I want you to remember this section as one of the future centres of ideal climate for consumptives, on a par with certain parts of Georgia, Tennessee and Texas. In Arizona may be found medium, as well as high altitudes in close proximity. This will enable the patient to spend winters at such places as Yuma, Florence, Prescott, Tucson or Maricopa Wells, while the summer may be spent in the neighboring mountains. Food is abundant and good in the above named places. At Yuma the rainfall has sometimes been less than one inch, though the usual quantity is from 3 to 5 inches. When in addition you consider the great distance from either ocean, you need not wonder that the factor of dryness is beyond dispute. As regards abundance of sunshine, I quote from Col. H. C. Hodge's book, "Arizona as It Is:" "The sky here during the whole year is almost invariably a clean, blue expanse of ether." The author made a special note of the fact that during his residence there of over two years there was never, not in all that time, in summer or winter, *one single day without bright, beautiful sunshine.*

The extreme purity of the atmosphere, and the almost continued and perpetual sunshine which pervades the Territory, has attracted the attention of every observant person who has been there either for a few months or few years.

It has become clear to my mind from all reports and personal observations, that for the United States the most

favored climes are to be found (roughly speaking) below the 38° of latitude. The misfortune is, that the regions with the nearest approach to the ideal climate lack most of the minor factors which, together with strict supervision, cannot and must not be set aside.

Without trying to be exact, and without any desire to squeeze into a fixed frame of rules the most favorable regions, I think that by looking at a map of our country you will be enabled to formulate a broad basis, which the future will endorse.

In the United States nature's ideal factors are best found:

First—Far inland, with shelter to north and west, and at high altitudes.

Second—Inland, with shelter to north, north-east and east, at medium altitudes.

Third—As regards latitude: Between 32 and 38 of north latitude.

Fourth—Of the former, I would further bound the region by naming New Mexico, Arizona and Southern Colorado, between the 105th and 115th degree of longitude and between the 32d and 38th degree of latitude and certain stations in California.

Fifth—Of the latter, by naming Northern Georgia, Eastern Tennessee (Cumberland Mountains), and Western Texas.

The western slope of the Rocky Mountains is to a great extent an unsettled country, and though there can be no doubt that local conformation must give rise to a beneficial climate, I must say that at present it is, climatically speaking, a terra incognito.

Surgeons of the United States Army who have served in Utah, and in that generally elevated region with high mountain plateaux, lying between the Rocky Mountains and the Wasatch Mountains in Utah, and between the latter and the Sierra Nevada of California, speak well of a number of localities as to equableness of temperature, dryness and a variety of altitudes.

We come now to consider the Pacific Coast, or rather what for our purpose amounts to the same thing, to *California.*

No climate upon the earth has had as much said or written for and against it as California. After searching through all the literature in reference to California, medical and non-medical, deliberate and prejudiced, I have at last been able to form some estimate of its true characteristics. One trouble appears to be that the State has every possible variety of climate, hot and cold, dry and moist, marine and mountain. This fact, and the old notion of the beauty of a "mild" climate, account for most of the discrepancies in statements, as also the variety of results attained.

California is the climate par excellence for equability of temperature, and if other facts were in accord, idealism would here be reached. This is unfortunately not the case. As a total the climate (or rather the stations now resorted to) must be set down as *equably cool and moderately moist.* Two mountain ranges run through the State longitudinally, the Coast Mountains and the Sierra Nevada. Theoretically I should judge that the first named would act as a condenser of moisture for the second, thus leaving the western slope (or if not that, the eastern) dry. But as a fact, the

Sierra Nevada does not occupy a sufficiently far inland position to escape the moisture of the Pacific.

In my future publication I will endeavor to collect the necessary data for establishing the character of the climate of the eastern and western slope of the Sierra Nevada, more especially south of the Yosemite Valley.

The well-known health resorts are all on or near the sea-coast. In the upper part of the State the diurnal changes are very great, as at San Francisco. This is credited to a deep sea current coming down from Behring Strait, which diminishes the ocean temperature, and flings cold winds into the warm interior as soon as the sun goes down and the heat radiates from the earth. Now if you look at a map you will find that at a point further south (below Concepcion), the shore turns to the south-east, and the current no longer exercises any effect. The warm Japanese current tempers the air in winter ; hence the equability.

Of all stations, Santa Barbara has the greatest reputation. This is a strip of land which begins at Point Concepcion, running from west to east, is sheltered on the north from the winds and rains of the Pacific by the Santa Clara range, and in part on the south by islands, from sea-moisture. The mean temperature is about 61 degrees (maximum of 80° in summer). The rainfall is from 12 to 15 inches. But I have ascertained that the mean humidity is between 65 and 70 per cent. of saturation. At Santa Barbara then the climate may be rated as equably cool and moist.

Fourteen miles from San Francisco is San Raphael, sheltered on the north and west from sudden changes.

San Bernardino is 75 miles inland, sheltered by mountains to the north, west and east.

In the Santa Clara Valley, back of the range of the same name, is San José, 50 miles from San Francisco, cool and moderately moist.

Finally, let me draw your particular attention to two localities which have been favorably reported on by the State Board of Health of California in connection with the establishment of a sanitarium :

First—The Sierra Madre Valley, in Los Angelos County.

Second—Atlas Peak, in Napa County.

Both places are the best illustration of the possibility of combining the best factors without great altitude and at no considerable distance from the ocean ; or, in other words, where the existence of the best ideal factors are due to local conformation.

Atlas Peak is the more accessible. It is on the second range of the Coast Range Mountains, about 12 miles from Napa City, at an elevation of 1,500 feet. The mean temperature is 62 degrees (summer mean 74°, winter mean 50°). There is said to be a freedom from harsh winds. The best feature, however, is the mean relative humidity, which is only 45 per cent., as low as in Southern Colorado. Verdict for this place :

Moderately and equably cool and dry, a close approach to the ideal.

GENERAL CONCLUSIONS.

Out of the foregoing web of many facts there are some points which I desire you to impress well upon your mind, and to refer to them when necessary.

Classifications in pathology are possible only in three different ways: First—Anatomical, in accordance with the pathological anatomy.

Second—Clinical, to be determined by difference in symptoms, differential diagnosis.

Third—Historico-etiological, as formed from the family history, as well as from predisposing remote and immediate causes.

We have seen the different factors found in pulmonary phthisis, according to pathological anatomy, to consist of hyperplasia of connective tissue, cheese and tubercle.

A clinical classification is not feasible when it is remembered that dullness, moist rôles, etc., admit of the presence of any one or all three of the pathological products

A classification based upon family history and the etiology of cases, will often allow of placing them under fixed headings with some approach to exactness The two factors in etiology are: *Hereditarily scrofulous* and *directly inflammatory*, and the products in either case may be proliferation of con-

nective tissue, cheese or tubercle, or any two or all three combined.

Under hereditary scrofulous we place : First—All those with hereditary tendencies not too remote. Second—Such in whom beneficial influences have been at work upon the organism for a long time, thus pressing their stamp indelibly upon them. Long-continued imperfect nutrition, bad ventilation, and of the lungs especially ; chronic blood-poisoning, as in syphilis ; long-continued abuse of the nervous system, as in onanism.

The second form is that of more or less directly inflammatory or acquired. The most common causes here are remnants of acute inflammations ; desquamation as a sequel of a finished inflammatory process ; influences from without, causing "colds," which are subsequently neglected ; influences from within, in the form of toxic conditions.

Patients with hereditary dispositions of course may acquire direct inflammation also, but you must remember that their relatively small amount of living matter renders such an inflammation of a low grade and sluggish from the beginning. Theirs are the corpuscles of low vitality and imperfect development, the fate of which is skrinkage and the formation of cheesy foci. This classification is valuable in the matter of prognosis.

Chronic phthisis of from eight to ten weeks' standing may be relied on for the presence of a destructive process or the residue of one ; oftenest a small cavity.

It follows therefrom that cavities, in a scientific sense, are the chief objects of treatment. This shows that cavities occur oftener than formerly supposed, and likewise that they are more amenable to treatment.

"The lungs are made to breathe cold as well as warm air—indeed, air of any temperature from Zero to 100° Fahr." —(Bennet).

The products of the clinical picture known as pulmonary consumption, are those of low forms of inflammation, the products of stagnation and embolism (necrobioses protoplasm), pointing indisputably to defective nutrition ; and this again is the result of a vitality either absolutely lowered or temporarily depressed below the physiological standard.

The best climate, collectively speaking, is a dry, cool, and sunshiny one.

Broadly speaking, we may say that consumption may be treated by *Nature's factors* (climatic influences), or by *artificial means* (strict hygienic supervision and medication at home). Remember always, that in expatriating patients, you must make sure that in their new surroundings medical supervision and local treatment are not abandoned. I insist upon this as the most vital point in the treatment of consumption. *Climatic influences and strict supervision and medication should not and must not be separated.*

In reference to treatment in general, remember : Our prime object is *to cure ;* regardless of whether the basis of our disease is one of specific inflammation ; whether the infection is dependent upon cheesy or specifically caseous material ; or upon immigration of corpuscular elements or of fungi ; or whether finally the deviation of the elementary tissues from the normal is of a *histological or histo-chemical character.*

"Only through animated interchange through the blood is it possible that such changes should take place in the products of inflammation, which lead to reabsorption, organi-

zation, corpuscular proliferation and softening. As the heart's power is dependent upon the nutrition of the heart and normal innervation by normal blood, and as normal acts of diffusion in the tissues are governed by the composition of this general juice of nutrition, it is above all of importance to endeavor to gain influence over this condition of blood by every well-tried means."—(Winternitz)

Whether a consumptive patient had better be treated at home, or by sending him to an institution or to a different climate at large, depends first of all things upon his means. Next you should make it clear to yourself whether you are dealing with a case of hereditary vulnerability or one of absolute acquirement. Next ascertain whether there exists a "fatal circle," and whether it be complete or incomplete, and then be governed by the following rules:

1. The fatal circle must be broken before a climatic change is to be thought of. Waste must not have too great an advance on repair.

2. The hereditary-vulnerable consumptives with a bad general condition, should remain and be treated at home, as change of climate will not compensate them for the change of food and habits.

3. The hereditary-vulnerable with acquired bad habits. To a cool or warm and dry climate, where above all you are sure of constant supervision by a conscientious physician. Best, perhaps, to a well-regulated sanitarium, if such can be had.

4. Hereditary-vulnerable patients with good digestion and assimilation. To a cool or cold and dry climate.

The chief instruction to all the vulnerable should be, to

immediately root out any perceptible irritation or disturbance of their pulmonary or gastric mucous membranes as soon as they occur.

5. Patients with acquired phthisis and a good general condition (includes those with recent pneumonic remnants): To the sea-shore or on a long sea-voyage, provided the phthisical process has not existed for more than a limited period. Or to a cool or cold and dry climate.

Superficial catarrhs of less than ten week's standing or so, are good cases for a sea-voyage or a warm, dry climate.

6. Acquired pulmonary consumption, but with disturbances from bad habits: First correct the functional disturbances at home, and then send the patient to a cool, dry climate, where the "artificial factors" are known to be satisfactory.

7. Acquired phthisis, with bad general condition: To a warm or cool and dry climate, or to a sanitarium not too far from home, located in a "health spot."

8. The proper altitude to start with in a given case, is to be governed by the strength and rapidity of the heart's action.

9. Pharyngitis, nasal catarrh, naso-pharyngeal catarrh laryngitis, in short, all irritations of the more superficial parts of the respiratory tract, must not be sent to a climate where low temperature and frequent winds are two of the factors. High altitudes (such as are found in Colorado) do not agree with this class of cases. To go to a cold, dry climate, the patient must be free from disease down to the clavicle.

Next let me give you some points, dwelt upon by Dr.

C. T. Williams, of London, as to the climatic treatment of consumption. He establishes a few clear rules, which can safely be transcribed to our climate, and, based as they are upon the general stages of consumption, do not conflict with our etiological decision as given above.

First—If a phthisical patient in any stage can take a fair amount of exercise without contracting fresh lung-irritation from exposure to meteorological changes, and if he have a good appetite, with diminishing cough and increasing weight, I should unhesitatingly advise him to remain at home and trust to treatment and to the food of the best dietary in the world—that of Old England.*

If, however, he cannot take exercise without constantly catching cold ; and if, when confined to the house, he lose appetite, become low-spirited, pine for fresh air, sunshine and change of scene ; and, above all, if the confinement act unfavorably on the digestive organs, causing bilious derangements and disinclination to the cod-liver oil, equally unhesitatingly I advise a trial of another climate, if the strength permit. There are a number of consumptives who profit more by food than climate, and never seem to thrive except on British fare. These had better stop at home, and try the sunshine of the south-coast.

All cases deemed *advanced*, whether on account of extensive tubercular consolidation of the lungs, or on account of considerable excavation of one or of both lungs, and cases of active tubercular disease ; or, again, those manifesting great irritation of the pulmonary or of the gastric mucous membrane, had better remain in England, as

* I subscribe to the above.—Author.

change of climate would not yield them a sufficient return for the alteration of food, life and habits, as well as the risk of the journey.

Nevertheless, those are often the patients who are most anxious to winter abroad ; and even when at death's door, they will not give up their hope that in another and a sunnier clime new life may be vouchsafed to them.

On the other hand, first stagers, and even where the consolidation is extensive, if the consumptive disease arise from inflammatory and catarrhal attacks, and if it be confined to one lung, do well to leave England ; and we may also advise the same to third-stage cases, where the vomica is small and quiescent.

Second—As regards the second point, be it remembered that a sea-voyage is a long and trying experiment, to which the invalid has to submit when once he embarks, whether it suit him or not, for several months. * * * * Then, again, the element of sea-sickness must be borne in mind, though fortunately consumptives appear to suffer less than other people. * * * *

The cases which I have seen profit most by sea-voyages are, first, cases of hemorrhagic phthisis ; second, cases of limited consolidation with no pyrexia, occurring in young men overworked at indoor occupations, and who have suffered from the septic influences of life in great cities. * * *

Third—* * * * The question whether a cold dry or warm dry atmosphere is the best for ordinary chronic phthisis, depends to a great extent on the individual's power of maintaining circulation and temperature. When these suffice, the cold climates are preferable ; but in the majority,

and especially for women, whose circulation is weaker, the warm and dry are the best, for they are thus enabled to live more in the open air. Elevation is of great importance, and I should always choose a mild climate with elevation to one without it. Mountain-air is not beneficial solely on account of its purity, for on this point sea and desert air may vie with it; there is another factor in the low barometric pressure and atmospheric rarefaction, and the expansion of the lungs thereby caused may be of great value in chronic first stages. At present the trial of mountain climates must depend on the supply of suitable accommodation and food for invalids.

Fourth—As to the desirability of moist climates for consumptive patients, the evidence is decidedly against their use in the treatment of ordinary chronic phthisis. The addition of warmth only makes the damp tell more unfavorably, though a strong saline element and invigorating breezes do something to counteract the humid influence; still even these do not place a moist climate on the same level as a dry one. There is one exception, however. Phthisis of catarrhal origin has been shown to profit most by a warm and equable climate, even though accompanied by a certain amount of moisture, as the evidence of Madeira witnesses."

Without wishing to overload the subject, let me add another general rule as to climate: Any change from city to country, or from sea-shore to the mountains, or vice versa, will most likely improve the general condition to the extent of gain in weight by the accumulation of adipose tissue, and an amelioration of such symptoms as cough and the irritation which calls it forth and keeps it up. But remember that the local process in the lung is equally as likely to remain in

statu quo. Therefore to cause an arrest of the lung trouble itself, it will be necessary to follow such change by an additional one to a dry, cool high altitude, or to a medium altitude, if the same be blessed with a sanitarium, or the conveniences of civilization be greater and nearer than can be obtained at high altitude.

In either case remember that the climate and altitude chosen must have a governing majority of the factors of an ideal climate, of which *dryness is the chief, and a certain equability of temperature the next.* Or in other words, the climate chosen must have such of the factors as will unquestionably entitle it to the appellation of an *aseptic climate;* of one which does not promote fermentation.

Another lever to assist you in perfecting your decision, is in the subjective feelings of the patient himself. This is especially valuable in cases where, to the best of your judgment, several climates and regions would appear equally favorable. The best rules in this connection are laid down by Prof. Loomis in his work on "Diseases of the Respiratory Organs."

"Every phthisical patient has a climate adapted to his peculiar diathesis; a few well-directed questions will enable you to determine in which direction and in what locality your patient will be most likely to receive benefit. In the first place, by careful questioning, determine whether your patient, when in a state of health, was most vigorous in warm or cold weather, in a damp or dry atmosphere. Again, you must determine whether he has most vigor in a dry and cold, or a dry and warm atmosphere, or in a warm-moist, or cold-moist atmosphere."

"If these questions cannot be settled by the experience of the patient, direct your patient to travel in the direction which seems best suited to his case, until he finds a locality where he is comparatively comfortable ; endeavoring to select a climate where he may be out-of-doors every day, and at any hour of the day." * * *

"In whatever locality a phthisical patient finds himself improving, it is important that he remain in that locality so long as he continues to improve."

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